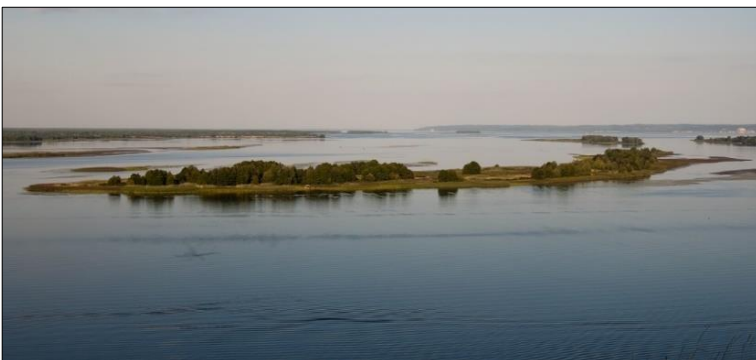
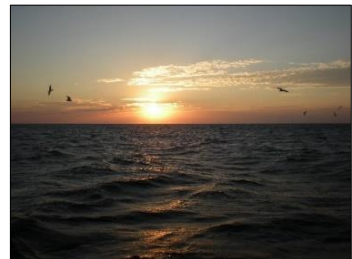


FISHERIES AND AQUACULTURE SECTOR STUDY OF UKRAINE



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Contents

Preparation of this document

Abstract

Acknowledgement

Abbreviations and acronyms

EXECUTIVE SUMMARY

1. INTRODUCTION

1.1. Geography and climate

1.2. Agriculture

1.3. Role of fisheries and aquaculture

2. INLAND FISHERIES AND AQUACULTURE

2.1. Inland water resources

2.1.1. Rivers

2.1.2. Natural freshwater lakes

2.1.3. Coastal lakes

2.1.4. Water reservoirs

2.1.5. Pond fish farms

2.1.6. Canals

2.1.7. Underground waters

2.2. Inland fisheries resources

2.3. Inland fisheries

2.3.1. Commercial inland fisheries

2.3.2. Recreational fisheries on inland waters

2.3.3. Management of fish stocks in inland waters

2.4. Inland aquaculture

2.4.1. Pond fish farms

2.4.2. Tank fish farms

2.4.3. Cage fish farms

2.5. Comparative summary of present and potential performance of inland fisheries and aquaculture

2.5.1. Declared, estimated actual and potential results of inland fisheries and aquaculture

2.5.2. Inventory of measures for reducing gap between declared, actual and potential results of inland fisheries and aquaculture

2.6. Conclusions and recommendations

3. MARINE FISHERIES AND AQUACULTURE

3.1. Marine waters and fishing grounds

3.2. Marine fisheries resources

3.3. Marine fisheries

3.3.1. Fisheries in the Sea of Azov

3.3.2. Fisheries in the Black Sea

3.3.3. Oceanic fisheries

3.3.4. Management of fish stocks in marine waters

3.3.5. Status of recreational fisheries in marine waters

3.4. Marine aquaculture

3.5. Conclusions and recommendations

4. SUPPORT INDUSTRIES

4.1. Fishing ports and landing instruments

- 4.2. Fishing vessels, gears, devices and equipment
- 4.3. Fish feeds
- 4.4. Processing and storing of fish and fishery/aquaculture products
- 5. TRADING WITH FISH, FISHERY AND AQUACULTURE PRODUCTS**
 - 5.1. Fish consumption and market demand
 - 5.2. Distribution and marketing of fish and fishery/aquaculture products
 - 5.3. Import and export of fish and fishery/aquaculture products
 - 5.3.1. *Import*
 - 5.3.2. *Export*
 - 5.4. Conclusions and recommendations
- 6. EDUCATION, EXTENSION AND RESEARCH IN FISHERIES AND AQUACULTURE**
 - 6.1. Education
 - 6.1.1. *Higher education*
 - 6.1.2. *Sector related activities and regulations on obligatory trainings and level of educations*
 - 6.1.3. *Challenges associated with fisheries and aquaculture education in Ukraine*
 - 6.2. Research
 - 6.3. Conclusions and recommendations
- 7. INSTITUTIONAL FRAMEWORKS**
 - 7.1. Social/civil societies
 - 7.1.1. *Associations of commercial fishers*
 - 7.1.2. *Associations of recreational fishers*
 - 7.2. Overall administration of the sector
 - 7.3. Statistics of and statistical support to the sector
 - 7.3.1. *Fisheries statistics*
 - 7.3.2. *Aquaculture statistics*
 - 7.4. Financial support to the sector
 - 7.5. Conclusions and recommendations
- 8. LEGAL FRAMEWORK GOVERNING FISHERIES AND AQUACULTURE**
 - 8.1. Scope of primary law and inter-linkages with other legislation
 - 8.2. Institutional arrangements related laws and regulations
 - 8.2.1. *Management and development of fisheries*
 - 8.2.2. *Management and development of aquaculture*
 - 8.3. Fish quality and consumers safety regulations
 - 8.4. International relationships of Ukraine on fisheries and aquaculture
 - 8.5. Conclusions and recommendations
- 9. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS**
 - 9.1. Inland Fisheries and aquaculture
 - 9.2. Marine fisheries and aquaculture
 - 9.3. Fish consumption and trading with fish and fishery products including import and export
 - 9.4. Education and research in fishery and aquaculture
 - 9.5. Institutional frameworks of fisheries and aquaculture
 - 9.6. Legal framework of fisheries and aquaculture

References

ANNEXES

Annex 1: Tables of sources data

Annex 2: SWOT analyses of the sector based on stakeholders' meetings

BOXES

Box 1.1: Culture based fisheries

Box 2.1: Definition of ponds and small water reservoirs

Box 2.2: Restocking program of inland waters and its state support

Box 3.1: Present effort on combating with IUU in Ukraine

Box 3.2: Future of mussel production in Ukraine

Box 6.1: System of education and levels of institutional accreditation in Ukraine

Box 7.1: The statistical forms of agriculture in Ukraine

Box 7.2: Statistical data is submitted to FAO in the following forms

Box 7.3: Specialized forms supporting form № 1A – fish “Aquaculture production”

Box 8.1: List of the main types of waters considered as fishery water bodies by law of Ukraine

Box 8.2: Fishing rules

Box 8.3: Association agreement between the EU and Ukraine

Box 8.4: Registration of marine ships in Ukraine

TABLES

Table 2.1: Renewable surface water resources (RSWR)

Table 2.2: Number of freshwater and marine fish species in Ukraine

Table 2.3: Daily quotas for amateur and sport fishers in Ukraine

Table 2.4: Declared and estimated actual and potential performance of inland fisheries and pond fish farms in 2015

Table 3.1: General economic data of marine fisheries of Ukraine

Table 8.1: Overview of the management of fisheries

Table 8.2: Overview of the management of aquaculture

Table 8.3: Overview of the management of fish processing

FIGURES

Figure 1.1: Geographical map of Ukraine

Figure 1.2: Climate map of Ukraine

Figure 1.3: Dynamics of the fish catching and the extraction of aquatic biological resources

Figure 2.1: River basins of Ukraine

Figure 2.2: Classification of surface waters in Ukraine

Figure 2.3: River map of Ukraine

Figure 2.4: Catches on inland waters

Figure 2.5: Aquatic bio-resources extraction by environment and their socio-economic data

Figure 2.6: Capture of aquatic biological resources in STRHs in 2015

- Figure 2.7: Some of the typical fishing vessels and gears used in large inland water bodies
- Figure 2.8: Some of the typical specialized pond fish farms their activities
- Figure 2.9: Tank and cage fish farms in Ukraine
- Figure 3.1: Ratio of Ukrainian catches in the Sea of Azov and the Black Sea in 2008-2013
- Figure 3.2: Dynamics of fish landing by Ukraine in the Sea of Azov in 2008-2015
- Figure 3.3: The main grounds for Black Sea sprat fisheries in the Ukrainian waters
- Figure 3.4: Dynamics of fish landing by Ukraine in the Black Sea
- Figure 3.5: Landing dynamics of the three major fish species in the Black Sea
- Figure 3.6: The Sea of Azov and the Black Sea and their major rivers
- Figure 3.7: Long-term dynamic of sturgeon landing in the Sea of Azov
- Figure 3.8: Ratio (%) of sturgeon species in commercial catches in the Sea of Azov
- Figure 3.9: Stocking of sturgeon fingerlings by Ukraine to the Sea of Azov between 1991 and 2014
- Figure 3.10: Tank and cage fish farms of sturgeons in Ukraine
- Figure 3.11: The percentage by weight of Gobiidae in scientific catches in the Sea of Azov (2003–2013)
- Figure 3.12: Long-term dynamics of gobies landing in the Sea of Azov
- Figure 3.13: Mass mortality caused by hypoxia
- Figure 3.14: Acclimatization of haarder (So-iuy mullet) to the Azov Sea basin
- Figure 3.15: Rehabilitation of Molochniy liman
- Figure 3.16: Dynamics of SSB and landings of haarder in the Sea of Azov (2005–2015)
- Figure 3.17: Long-term dynamics of salinity in the Sea of Azov
- Figure 3.18: Dynamics of SSB and landings of Azov turbot in the Sea of Azov (2006–2015)
- Figure 3.19: Landing of Azov anchovy in the Sea of Azov and in the Black Sea
- Figure 3.20: Mussels production in Ukraine between 2000 and 2014
- Figure 5.1: Consumption of fish and fish products in Ukraine (kg/per person/year)
- Figure 5.2: The species composition of most popular freshwater fishes in 2000 and 2015
- Figure 5.3: Dynamics of fish consumption (kg/capita) in Vinnytsya region (the highest) and in Lviv region (the lowest) in 2015
- Figure 5.4: Dynamics of fish and fish products consumption per person in some regions of Ukraine between 1999 and 2015
- Figure 5.5: Dynamics of fish and fish products import in Ukraine
- Figure 5.6: Structure of Ukrainian fish exports as per countries in 2015
- Figure 5.7: Dynamics of export and import
- Figure 6.1: Research on fisheries in Ukraine
- Figure 7.1: Positioning of aquaculture in the new Classification of Economic Activities (NACE-2010) (CEA DK 009: 2010)
- Figure 8.1: Elements of the fisheries and aquaculture sector management to which laws are assigned
- Figure 8.2: Quota allocation systems in Ukraine

PREPARATION OF THIS DOCUMENT

The National Reform Council (NRC) of Ukraine has recently approved the Strategy for Agriculture and Rural Development of Ukraine and Strategy Action Plan.

In order to achieve some concrete results that could be demonstrated in 2016, legal draft texts, studies and capacity building activities addressed under the Action Plan 2015-2016 have to be implemented. However, the Ministry of Agrarian Policy and Food of Ukraine (MAPF) needs policy and technical support for an immediate action and this could put at risk the credibility of the Strategy. For this reason Norway financed FAO project titled “**Contribution to the technical and policy support to the Ministry of Agrarian Policy and Food of Ukraine (MAPF) for the implementation of the Strategy for Agriculture and Rural Development 2016-2020**” (GCP/UKR/001/NOR) is implemented to complement the efforts made until now by the Government and other stakeholders (especially the technical assistance provided so far by the European Union’s Delegation to the MAPF), and will be implemented in close cooperation with the coordination team under the MAPF as well as rest of donors actively involved in the formulation of the Strategy in the last year.

The envisaged **goal of the project** is to contribute to the coordination and implementation of the Strategy for Agriculture and Rural Development 2016-2020 and particularly supporting the established secretariat supervised by the Ministry of Agrarian Policy and Food and the European Union. It is expected that **the impact of the project** will be a solid contribution to a modernization of the agricultural sector of Ukraine, to increase food safety and sustainable production, and to facilitate economic growth of rural areas. The **outcome of the project** i.e. Support awareness and implementation of relevant legal documents, monitoring systems, studies and pilot projects will be manifested in (1) Policy frameworks strengthened, (2) Nutrition and food security systems strengthened, (3) Technical support on Forestry provided and (4) Technical support on Fisheries provided.

The key activity of the **fishery component of project** is “Technical contribution for the preparation of a comprehensive study of the state of the fishing industry and evaluation of the fish production of Ukraine. In case of fishery component of the project the objectives are twofold:

1. Revision and enhancement of the legal framework to contribute to the modernization and development of aquaculture, facilitation of granting water bodies for use on lease terms, control of fishing, enhanced combating against illegal fishing and trade in fishing products. Unification of Ukraine’s fishery legislation to align with the European Union legislation.
2. Support for the institutional development of the state administration body for fishery, as well as other institutions performing state administration functions in the industry. This would also include evaluation of the necessity for institutional changes in administration of fisheries (State Agency of Fisheries of Ukraine and its territorial bodies) and development of a concept of reforming the fishery of Ukraine (framework document).

ABSTRACT

The fishery and aquaculture sector review of Ukraine made in the frame of Norway financed FAO project, GCP/UKR/001/NOR elaborated by a team¹ of highly qualified professionals.

Structure of the review allows to present the entire sector including the inventory of available water and fisheries resources, inland and marine fisheries and aquaculture, support industries, fish trade, education, extension and research, as well as institutional and legal frameworks governing the sector.

In addition to the concise overview of sector related facts, each chapter is closed with a set of conclusions and recommendations relevant to the given chapter, while at the end of the document the last chapters presents those most important project proposals which being considered and implemented in the technical, administrative and legal spheres sphere will contribute to the required sustainable development of fishery and aquaculture sector of Ukraine.

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ABBREVIATIONS AND ACRONYMS

CBF	Culture based fisheries
CEA	Classification of Economic Activities (CEA DK 009:2010)
CEE	Central and Eastern Europe
CITES	Convention on International Trade in Endangered Species
DCFTA	Deep and Comprehensive Free Trade Areas
EEAS	European Union External Action Services
EEZ	Exclusive (maritime) Economic Zone
ENP	European Neighbourhood Policy
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
GFCM	General Fisheries Commission for the Mediterranean
GO	Governmental Organization
HKRS	
IFME	Institute of Fisheries and Marine Ecology
INMARSAT	International Marine/Maritime Satellite
MAPF	Ministry of Agrarian Policy and Food
NACE	Statistical Classification of Economic Activities in the European Community
NACEE	Network of Aquaculture Centres in Central-Eastern Europe
NAFO	Northwest Atlantic Fisheries Organization
NGO	Non-governmental Organization
NIN	National Institute of Nutrition
NPRA	Nomenclature of Fisheries and Aquaculture Products
RSWR	Renewable surface water resources
SAF	State Agency for Fisheries of Ukraine
SAQ	Scientific Committee on Aquaculture
SIPAM	Information system for the promotion of Aquaculture in the Mediterranean
STRH	Abbreviation of “Специальные Товары Рыбы Хозяйство” with Latin letters
UAH	Ukrainian hryvnia
UN	the United Nations
UNECE	European Commission and United Nations Economic Commission for Europe
USD	North American Dollar
USSR	Union of Soviet Socialist Republics

EXECUTIVE SUMMARY

The fishery team has compiled the first draft of the fishery and aquaculture sector review of Ukraine. Though the review is not completely finalized yet, the fishery team can already conclude that geographical and hydrological conditions of the country are favorable for and there is a great potential for developing a sustainable fishery and aquaculture both in inland and marine waters.

In spite the huge potentials of fisheries and aquaculture there are some specific segments of the sector which require assistance to enhance development. These have technical, administrative and legal nature.

Technical aspects and actions to be considered for developing the sector

- A list of inland surface waters and their characterization by typical qualities important for fisheries and aquaculture should be developed and improved.
- Maximum sustainable fish production potentials of different water bodies should be determined.
- Catch limits for all species sensitive for anthropogenic impact and changing natural conditions should be determined and established.
- Protection status of vulnerable fish species and ecosystems should be revised on a regular basis to increase effectiveness of relevant measures.

Administrative aspects and actions to be considered for developing the sector

- Transparent and measurable amateur fishing management methods should be established both in inland and marine waters.
- A transparent and reliable system for renting public waters and issuing licenses and quotas should be introduced, where duties and benefits are equally set and observed.
- An overall reform in sector related statistical services should be introduced.
- Laws combating IUU fishing should be enforced and public awareness should be increased.
- Reforms should be introduced in the education and research subsectors of fishery and aquaculture and an increased collaboration should be developed with the industry.

Legal aspects and actions to be considered for developing the sector

- A transparent and easy to follow legal framework should be developed for both commercial and amateur fisheries and aquaculture.

1. INTRODUCTION

1.1 Geography and climate

Ukraine located in Eastern Europe and bordered by Poland, Belarus, Russian Federation, Romania, Republic of Moldova, Hungary and Slovakia. It has a total area of 603 550 km². The land area is 579 330 km² (96%) and the inland water area is 24 220 km². The territory of the country is lowland with regions of varied elevation (Figure 1). The country is divided for 24 provinces (oblasts). Kiev and Sevastopol has oblast status. Population of Ukraine is about 45 million out of which 69.7% lives in towns.

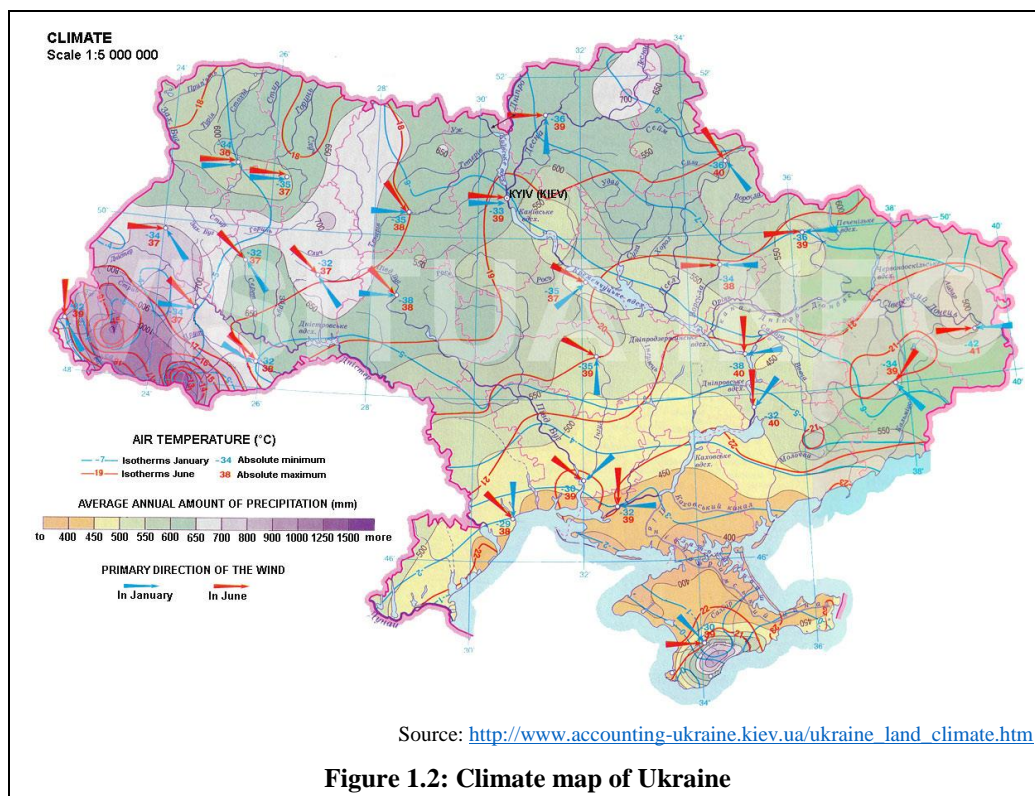


Ukraine has temperate continental; Mediterranean only on the southern Crimean coast; precipitation disproportionately distributed, highest in west and north, lesser in east and southeast. Winters vary from cool along the Black Sea to cold farther inland. Warm summers are typical across the greater part of the country with hot in the south (The World Factbook 2016). The average precipitation is 565 mm (AQUASTAT 2016). There are four agro-climatological zones in Ukraine:

- Humid zone in the north-west (35% of the country). Average annual precipitation: 600 mm.
- Warm zone, the eastern and central forested steppe (25% of the country. Average annual precipitation: 500 mm.
- Semi-arid zone, the northern steppe and the far-east the Donets high plain (25% of the country). Average annual precipitation: 450 mm.
- Arid zone in the south (15% of the country). Average annual precipitation 350 mm.

1.2 Agriculture

The agricultural area (i.e. arable land and permanent crops, meadows and pasture) is estimated at 41 000 000 ha. This is 68% of the total area of the country. The potential for agricultural production is evenly spread throughout the country, but two centres are especially distinct. The western region with moderate climate and the southern region where irrigation is prevailing (AQUASTAT 2016).



Both the geographical and climatic conditions in Ukraine are favorable for agriculture which was substantially developed and supported in the past. Relief map of Ukraine (Figure 1.1) shows waste flat and slightly hilly regions which were suitable for building water reservoirs which facilitate not only irrigated crop production but also support inland fisheries and aquaculture.

1.3 Role of fisheries and aquaculture

Both fisheries and aquaculture have a significant role in the everyday life and the economy of Ukraine in spite production of both capture and culture fisheries are showing a declining tendency (see Figure 1.3).

The right of people catching fish free of charge in public waters has a constant pressure on the aquatic bioresources creates a unique situation, which call for special professional attention from the decision makers.

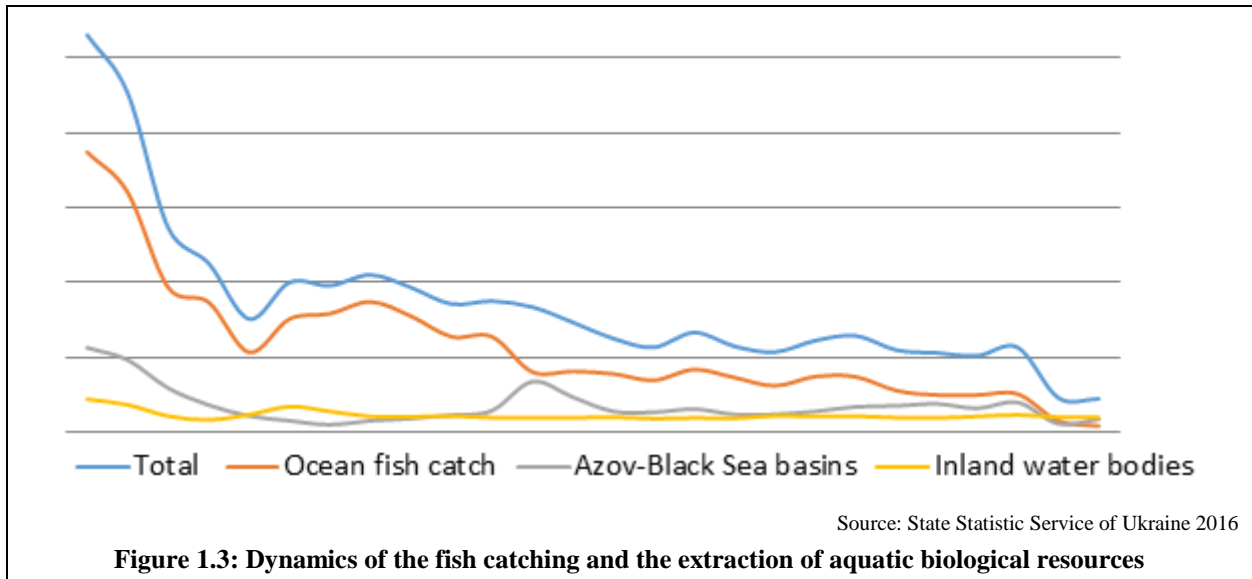
Beyond extensively practiced amateur fishing (i.e. angling) inland and marine fisheries supply affordable protein rich fish for the

Box 1.1: Culture based fisheries

Culture based fisheries (CBF) is a widely practiced technique of managing fish stocks of natural and man-made waters. This includes science based restocking younger generations of those fish species which are widely captured by amateur and commercial fishers.

There are voices among environmentalists around the world, that such interference into the nature (i.e. restocking) is too drastic which changes aquatic environments radically the need for fish manifested in increased fishing pressure justify properly planned and executed CBF in most inland waters exploited by amateur or/and commercial fishers.

population. As sustainable fisheries exploitation of inland and marine waters requires special fisheries management measures including restocking of widely captured fish species and protection of endangered ones through artificial propagation the role of aquaculture is also significant in Ukraine. In addition to culture based fisheries (see box 1.1) the role of aquaculture in the mass production of table fish is also significant.



2. INLAND FISHERIES AND AQUACULTURE

2.1 Inland water resources

Ukraine is especially rich in surface water resources. The country can be divided into seven major river basins which all but one (Western Bug) discharge into the Black Sea (see Figure 2.1 and Table 2.1).

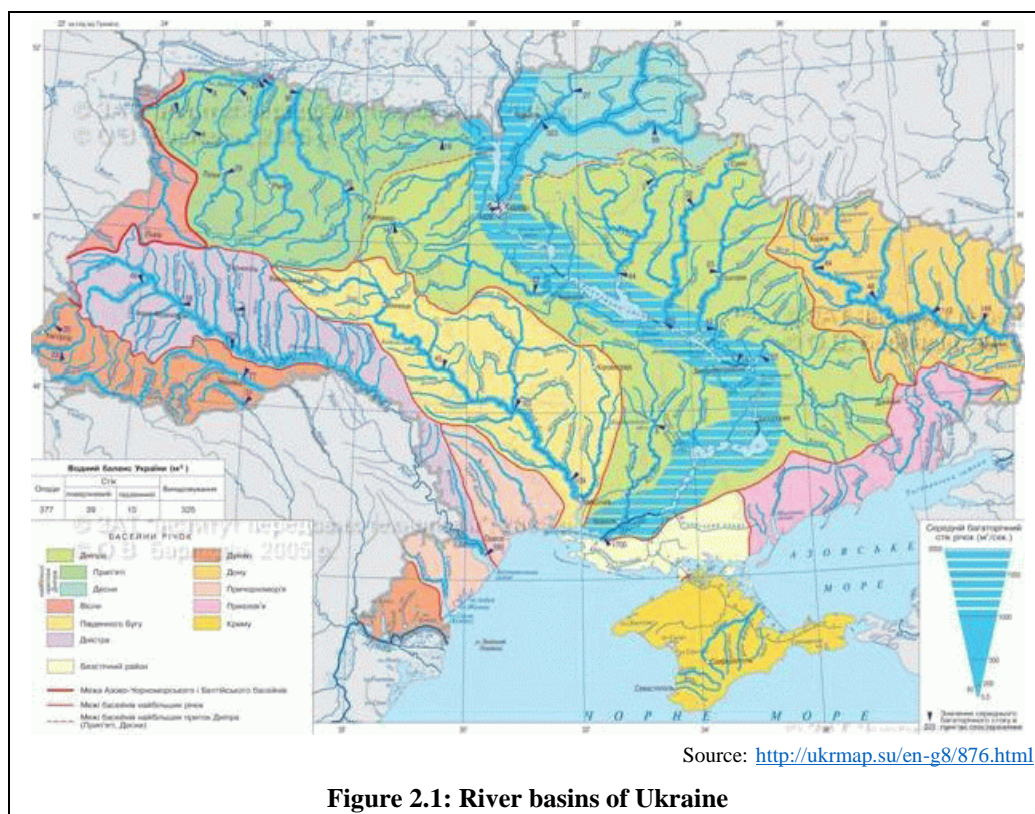


Figure 2.1: River basins of Ukraine

Table 2.1: Renewable surface water resources (RSWR)

Name of basin	% part of country area	Internal RSWR (10 ⁶ m ³ /yr.)	Inflow from		Total RSWR (10 ⁶ m ³ /yr.)	Outflow to
			(10 ⁶ m ³ /yr.)	From		
Dnipro	65	20 400	24 700	Belarus, Russian Fed.	45 100	Black Sea
Dniester	12	9 200	10 120	Rep. Moldova	19 320	Black Sea
Coastal	7	3 100	110	Rep. Moldova	3 210	Black Sea
Danube	7	9 400	84 050	Border with Romania	93 450	Black Sea
Siverskyi Donets	4	2 700	1 200	Russian Fed.	3 900	Russian F.
Southern Bug	3	3 400	-		3 400	Black Sea
Western Bug	2	1 900	-		1 900	Poland
Total	100	50 100	120 180		170 280	

Source: AQUASTAT 2016

Inland surface water resources occupy 4 % of the country a total of 2 422 000 ha. These very considerable resources consist of natural (rivers, lakes and lagoons) and man-made (canals,

reservoirs and fish ponds) water bodies. In Figure 2.2 surface waters are divided for lotic (river) and lentic (lake) freshwater or brackish water ecosystems. As the size of water bodies also counts at fisheries and aquaculture this figure also distinguishes water reservoirs by size.

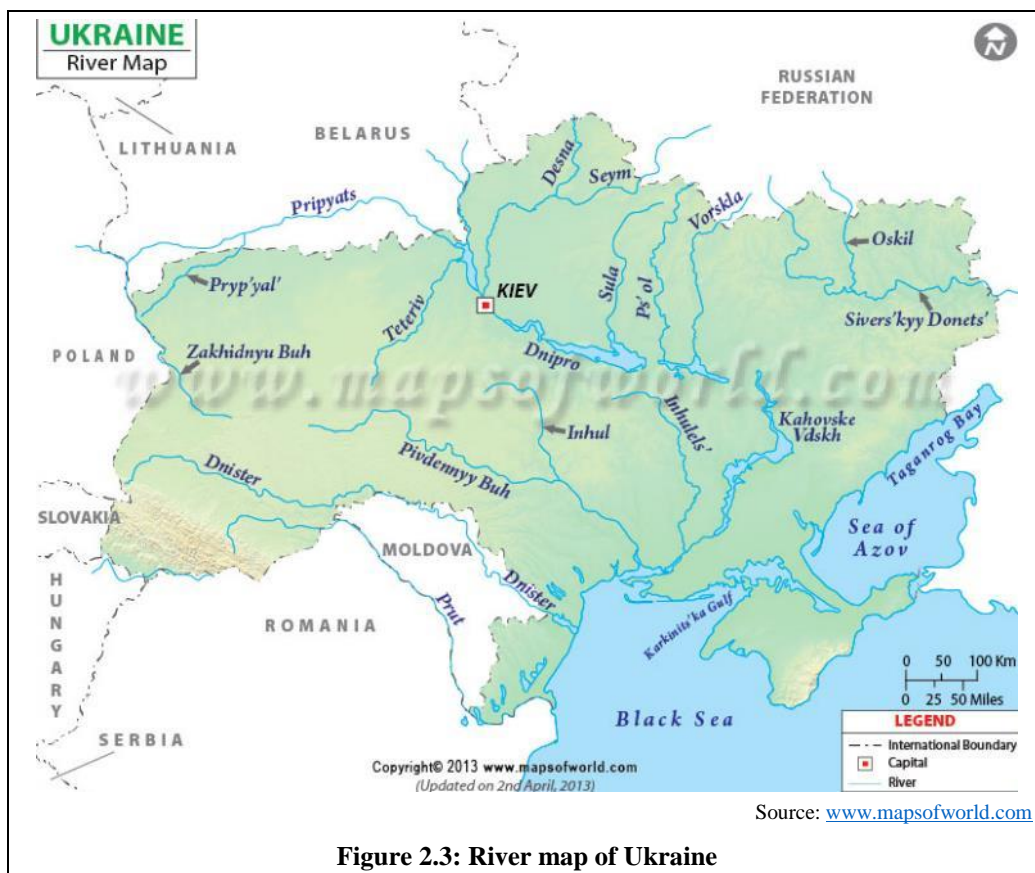
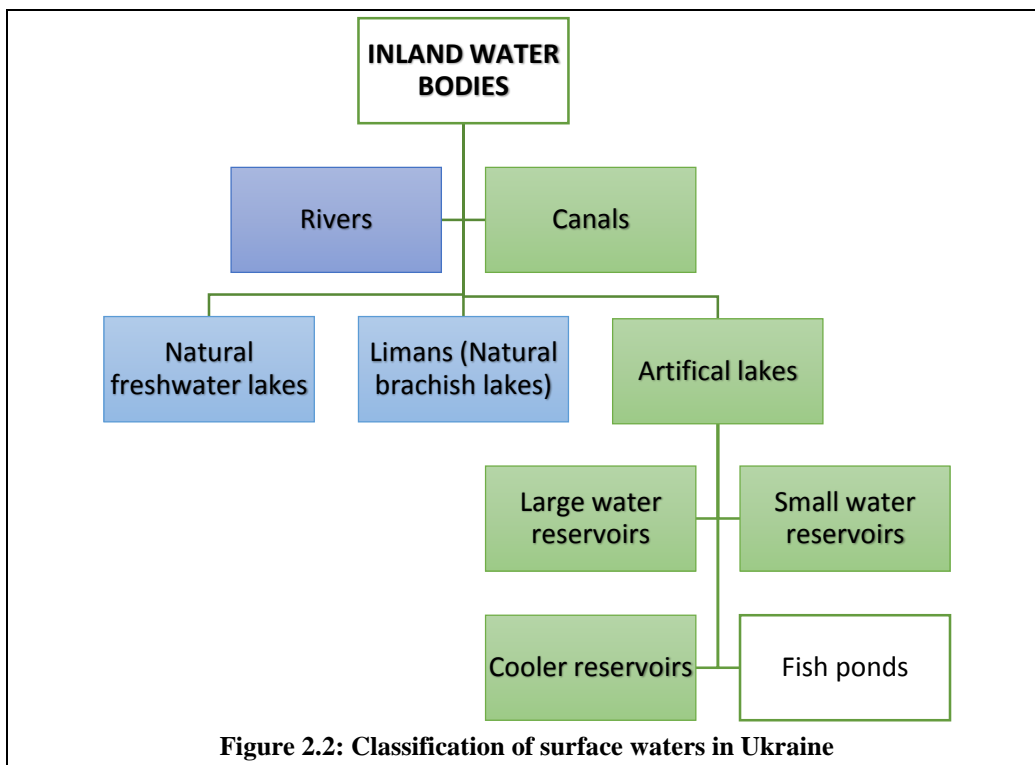


Figure 2.3: River map of Ukraine

Some of the Ukrainian rivers and water reservoirs are among the largest and most potential ones not only in Central and Eastern Europe (CEE), but also in Central Asia (Berka 1990). In addition to large water bodies there are numerous smaller ones, which are important locally and their total area represent significant water resources and potential fish producing area even on macroeconomic level of the country.

2.1.1 Rivers

There are about 23 000 rivers in the territory of Ukraine (see Figure 2.3). Their combined length is about 180 000 km and their estimated mean total area could be as much as # ha. Most of the rivers are small and short; only 117 rivers are longer than 100 km (estimate total mean water surface # ha), while 13 are longer than 500 km (Encyclopedia of Ukraine 1993B). Table A1-1 list the largest 60 rives of Ukraine. Their total length is almost 18 000 km and their total water area # ha.

2.1.2 Natural freshwater lakes

Lakes in Ukraine are fluvial origin (Encyclopedia of Ukraine 1993A). There are about 3 000 natural lakes. They are 60-70 ha on an average. Their total area is about 200 000 ha. Furthermore there is about 1 200 000 ha swamps (AQASTAT 2016). The key parameters of the largest freshwater lakes are presented in Table A1-2. These waters are usually fertile and suitable for growing fish.

2.1.3 Coastal lakes

There are numerous coastal lakes (i.e. lagoons) called limans. Their average size is larger than the freshwater natural lakes. Their total area is about 576 000 ha (see Table A1-3). Coastal lakes are shallow and fertile in which depending on location and season salinity varies between 2 and 50 ‰.

2.1.4 Water reservoirs

In the past many water reservoirs were built in Ukraine. These can be well categorized by size.

Box 2.1: Definition of ponds and small water reservoirs

There is a long, several hundred year long tradition of construction and use of small agricultural water reservoirs in Central and Eastern Europe. These relatively shallow reservoirs also called dams which are actually barrage ponds are built across gently sloping valley in order to accumulate runoff of rain or season or perennial streams. Such reservoirs are also called pond which term covers the same; a small water body with a single dike across the valley on which a concrete dike and often also a separate overflow (small spillway) are constructed.

Between the 1960's and 1980's SUCH reservoirs were constructed inside of the former collective and state farms in USSR. Therefore in the past most of them had at least one of such small water reservoirs in Ukraine (see Table A1-4).

Small water reservoirs

According to the Encyclopedia of Ukraine (1993A) there are about 18 000 small water reservoirs which are scattered throughout the agricultural regions of the country.

As per other sources there are more than 50 500 small ponds and water reservoirs (see definition in Box 2.1). Their combined total area is nearly 537 000 ha (see Table A1-4). The average size of so called pond and small water reservoirs is between 5.8 and 226 ha respectively.

Large water reservoirs

There are about 1 103 large water reservoirs built on different rivers. Their total area is 878 300 ha and their total water storage capacity is $55\,500 \times 10^6 \text{ m}^3$ (AQUASTAT 2016). These reservoirs include 13 500 ha of 16 cooling reservoirs of power stations. Out of the largest water reservoirs the most important ones consist the cascade of Dnipro water reservoirs (see Table A1-5).

2.1.5 Canals

The largest water canals derive from the different water reservoirs built on the Dnieper. Their total length and estimated combined area is about 1 050 km and 5 270 ha (see Table A1-6).

2.1.6 Pond fish farms

There are a total of # specialized fish farms in Ukraine. Their total and average area is 53 125 ha and # ha respectively (see Table A1-7).

2.1.7 Underground waters

Ground water resources are projected according to regional evaluations at a level of $61.69 \times 10^6 \text{ m}^3/\text{day}$ ($22\,500 \times 10^6 \text{ m}^3/\text{yr.}$). Their distribution in the territory of the country is uneven. The bulk of the projected resources are located in the northern and north-western oblasts, while in the southern oblasts of Ukraine have limited ground water resources (MEPNS² 2016).

Artesian wells are found at an average depth of 100-150 m in the north and 500-600 m in the south (FISHSTAT 2016).

=> Hot springs and thermal waters?

2.2 Inland fisheries resources

There are 249 different fish species in the waters of Ukraine. A total of 136 (54.6 %) are freshwater species among them there are 26 commercial and 64 games fishes (see Tables 2.2 and A1-9).

Table 2.2: Number of freshwater and marine fish species in Ukraine

Occurrence	Species (No.)		
	Freshwater	Marine	Total
Native	115	111	226
Endemic	1	1	2
Introduced	16	0	16
Not established	2	1	3
Misidentified	1	0	1
Questionable	1	0	1
Total	136	113	249

Source: FishBase 2016

² Ministry for Environmental Protection and Nuclear Safety of Ukraine

2.3 Inland fisheries

2.3.1 Commercial inland fisheries

Inland waters of Ukraine represent a huge potential for fish production. At present from the 2 422 000 ha inland waters only about 37% (897 500 ha) is known to be utilized by commercial fisheries. It is in spite that practically all inland water bodies could and should be utilized with fisheries of very low prime costs. In addition, there are inland waters (mainly smaller rivers and all large irrigation canals) which are not exploited by fisheries at all.

There are two types of fishery management of inland waters; CBF in large and STRHs³ in smaller and small water bodies.

Fisheries in large inland water bodies

Dnieper reservoirs (797 000 ha), cooler reservoirs near power stations (13 500 ha) and Black and Azov Seas' estuarial systems (87 000 ha) represent a huge fish production potential. Their combined total area is 897 500 ha. All these kind of productive large shallow water bodies can be utilized with CBF i.e. ranching of high value fish with very low prime cost.

As summarized in Table A1-12 total landings of fish from Dnieper reservoirs was 9 795 tons (12.3 kg/ha) in 2015.



Figure 2.4: Catches on inland waters

Mass of the catches are Chinese major carps, breams and crucian carp but valuable species such as common carp, pikeperch, European catfish and tench are also part of catches (Photos by courtesy of Alexander Didenko)

By official data from restocking of bighead and silver carps (more precisely their hybrids) in Dnieper's reservoirs and Black and Azov Sea' estuarial systems was around 670 tons in 2015. By expert opinion their production in Dnieper's reservoirs was 510 tons which is only 30 % of the actual total catch of herbivorous fishes. In the past captured fisheries of Chinese carps in Dnieper's reservoirs was alone around 5 000 tons. The average nature fish production of these reservoirs is

³ Abbreviation of Special Table Fish Production Farms from "Специальные Товары Рыбы Хозяйство". STRH is regime of using reservoirs, lakes and parts of big water bodies); in Ukrainian statistic date captured fish from STRH companies is sown like fishery (not aquaculture).

14.2 kg/ha. According to the Institute of Fisheries of the National Academy of Agrarian Sciences of Ukraine the highest fish productivity was 19.7 kg/ha, while the least one was 8.6 kg/ha in 2015. The characteristics of fishery exploitation of large inland waters is that license is given to several fishing companies on the same waterbody, within which catches of the companied are not restricted to a certain area or section, but fishing can be practiced freely anywhere within the boundary of the given water body. It is only the range of allowed fish species and their quotas are established and allocated as described in Chapter 2.3.3. In 2015 a total of 432 (according to other sources presented in Table A1-15 only 332) licensed fishing companies operated in inland waters.

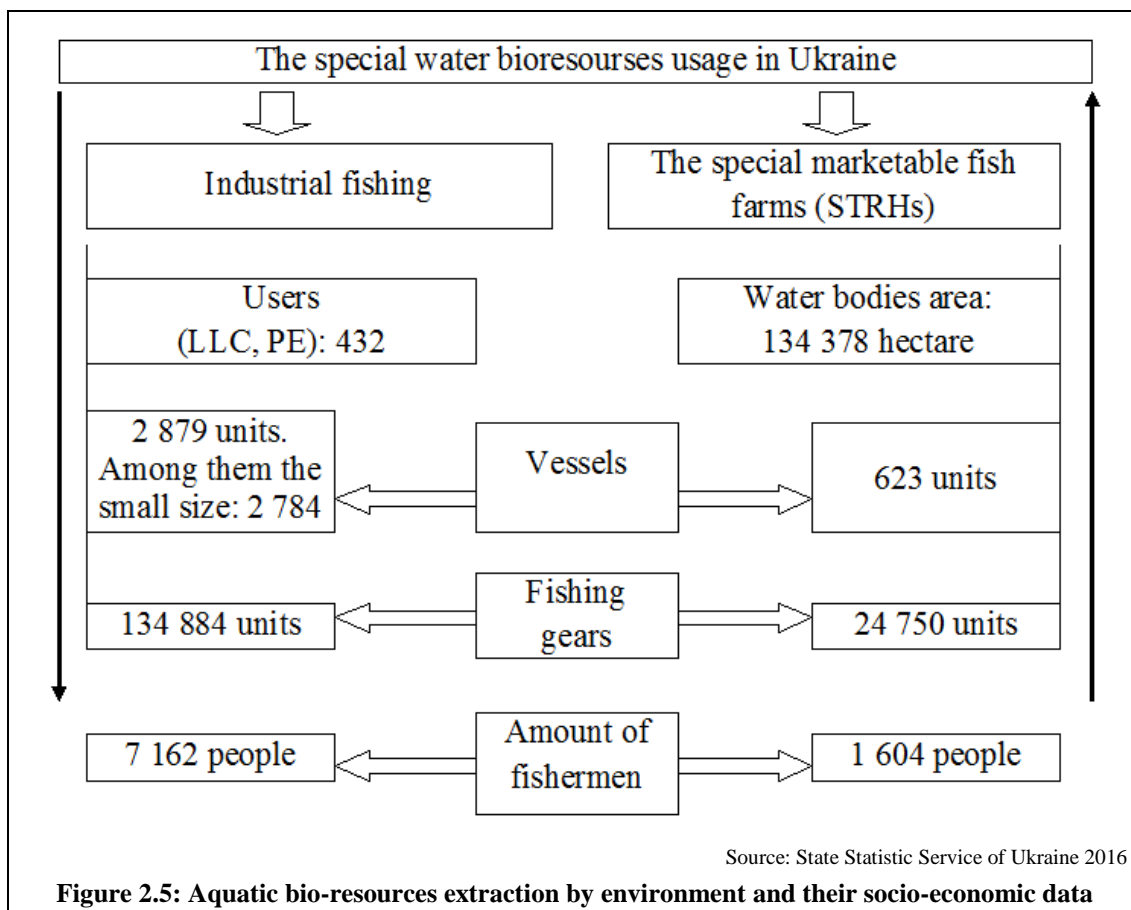


Figure 2.5: Aquatic bio-resources extraction by environment and their socio-economic data

Culture based fisheries in medium size natural water bodies (STRHs)

On natural lakes, as well as on some not so large water reservoirs there is a special fishery exploitation regime, named “Specialized marketable fish farm” (in Ukrainian STRH). Here licenses are given free of charge and the allowed and approved fishery management is CBF with one single condition; that water cannot and should not be discharged. In case of STRH on each water body only one company gets permission. Usually carps are produced on this way because companies are reluctant to invest in more expensive fish seed as license can be revoked any time. Prior to issuing state permission each company must get a “Scientific justification” from a science or research institution together with an approval issued by state environmental authorities i.e. by the local department of Ministry of Ecology and Natural Resources of Ukraine.

There are contradicting figures on the number and production of STRHs. One source declare that there were 754 STRH companies which managed a total area of 160 730.8 ha in 2014 while Figure 2.5 presents different information.

According to official statistics the total catch of STRHs was 7 258 tons in 2015. This was only 31.5 % of agreed and approved production plans. Out of this result the total catch of Chinese carps

and common carp, which are considered as the main fish species for ranching, was about 4 000 and 1 000 tons respectively.

Analysis shows that catches in STRHs in 2015 mostly consist of Chinese major carps (see Figure 2.6).

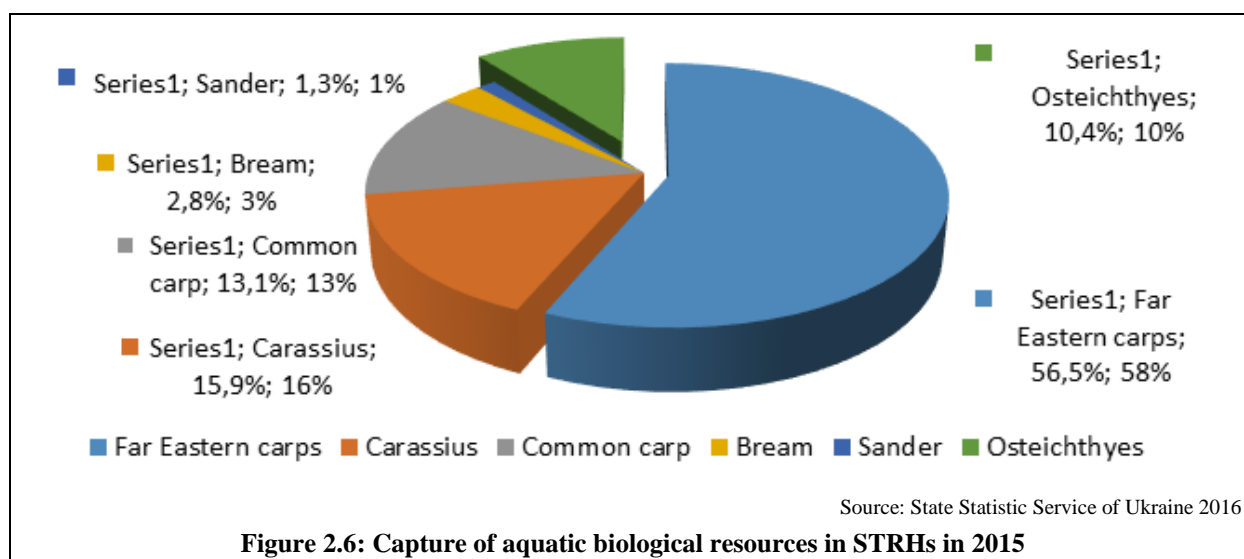
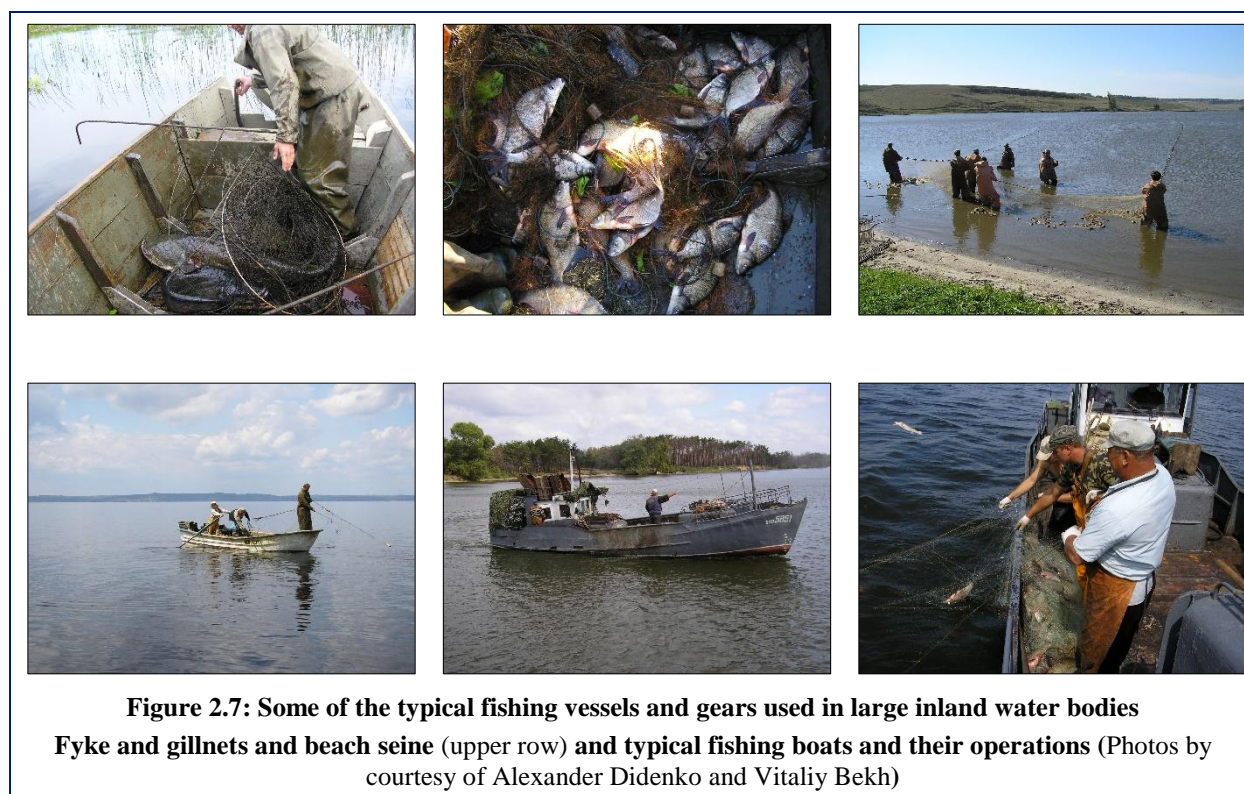


Figure 2.6: Capture of aquatic biological resources in STRHs in 2015



2.3.2 Recreational fisheries on inland waters

Recreational fisheries in Ukraine is free of charge, excluding water bodies (or its parts) which are protected (nature protected areas, used for technological purposes and as reservoirs of drinking water, etc.). As set in Article 27 of the **Law "On Fauna"** it is a basic civilian right of angling on

inland waters of Ukraine. Therefore in fisheries waters open for public amateur and sport fishing are free of charge in the ranges presented in Tables 2.3 and A1-18. Rules of recreational and sport fishing in Ukraine are established by the Order of the Committee of Fisheries of Ukraine N 19, 15.02.1999.

It is allowed recreational and sport fishing only by rods and hooks i.e. angling. Gillnets, beach seines, hook longlines, fyke nets and other fishing gears used for commercial fishing are prohibited for recreational and sport fishing.

Water bodies and terms of their using for amateur and sport fishing are determined by fishery inspection (i.e. by territorial bodies of the State Agency of Fisheries of Ukraine) under scientific research. In case there are no such scientific research for a particular water body, terms of its use for the amateur and sport fishing is set by ichthyologic department of fishery inspection.

It is widely experienced that recreational (amateur and sport fishing) fisheries has a significant impact on fish resources, but because of the lack of relevant statistics there is information neither on the actual number of amateur fishers nor on their yearly catches.

Table 2.3: Daily quotas for amateur and sport fishers in Ukraine

Types of aquatic bioresources	Water bodies of common use (kg/day/person)	Water bodies assigned to public organizations, as well as those where paid fishing ⁴ is provided (kg/day/person)
Fish	3	5
Crayfish	30	50
Mussel	5	8
Conch shell	10	20
Shrimp	1	2

2.3.3 Management of fish stocks in inland waters

The characteristic inland fisheries management in Ukraine is and should remain CBF. It is carried out through established quotas and replacement of captured fish stocks by stocking. The main mean of regulations on fishing in inland waters is science based determination of total allowable catches, from which quotas are determined. It is done according to legislation requirements and approved by the Ministry of Agrarian Policy and Food of Ukraine upon the request of the State Agency of Fisheries of Ukraine. For large reservoirs, the main method of stock assessment is computational method based on estimated fishing, mortality coefficients and data of official fishery statistics.

These quotas are based on the actual fish stocks estimated by specialized scientific/research institutes. Accordingly, there are established annual commercial catch limits for all main fish species in inland waters. Catch limit for fish species is approximately 25% of estimated stocks presented in Tables A1-14. Quota allocation in the Dnieper reservoirs is also carried out by a specialized inter-institutional commission created at the State Agency of Fisheries of Ukraine

⁴ It should be noted that there is no subordinate legislation, which establish the procedure for charging for amateur and sport fishing and fishermen's license. This rule is not implemented at this time.

based on the applications of fishing enterprises. It is common that the total amount of quotas applied for exceeds the limit by 2-3 times.

In return receiving quotas fishing companies must pay the tax for “special use of water live resources”. The extent of this tax depends on the actual range and quantity of fish species captured. At present when quotas are used, information on fish catches is provided by quota users once a month and yearly. Quotas also reflect limits currently established for the most abundant commercial species, the stocks of which can be potentially overfished (common carp, roach, bream, silver bream, pikeperch).

A new approach for quota allocation is anticipated from 2017, according which quotas for certain segments of the estimated fish stocks will be allocated to fishing enterprises for a period of five year. Taking into account that quota allocation is based on quantitative criteria (i.e. mean catch for previous four years) this approach can be objective and official. At the same time, there are certain discrepancies between current regulations and the use of this method which should be eliminated still before the introduction of this new approach of quota allocation.

Since 2016 an additional mean of access limitation to fish stocks is limitation on the number of fishing gears and vessels (see Table A1-16). However, these limitations in fact duplicate the quotas because the number of fishing gears for each fishing enterprise is determined according to the allocated quota. Nevertheless, fishing gears and vessels are objects, which are easier to control than the amounts of captured fish, therefore this additional limitation seems to be necessary under current conditions.

For prompt correction of qualitative and quantitative parameters of fishing effort, there are commercial fishing regimes, which are developed every year and which supplement and adjust the standing Fishing Regulations. The majority (70-80%) of stocks in the fishing regimes in the Dnieper reservoirs are related to the introduction of additional bans and limitations. In particular, Fishing Regulations allow 30 mm as minimum mesh size in gillnets, while Fishing Regime allows 36-38 mm. Moreover Fishing Regulations allow 70 mm mesh size, while Fishing Regimes does not allow them. There are also differences in still acceptable minimum sizes of captured fish, etc.

As already mentioned inland recreational fishing is open access in public waters and relevant regulation is fulfilled through establishing a daily catch and maximum number of hooks per one angler (3 kg and 5 hooks). However, these rules are often violated, as well as there is no reporting on the amounts of fish caught by amateur and sport fishers. For this reason it is especially difficult to calculate with and restock fish captured on this way.

Another problem of accurate fish stock assessment in the Dnieper reservoirs is the use of mathematical methods, which are based on fish catch amounts and therefore it is not very accurate and reliable, taking into account that currently significant part of caught fish is not reported or harvested by illegal fishermen. Use of active fishing gears such as trawls for direct fish stock assessments in the reservoirs is limited by their snaggy bottoms. Furthermore, a ban on trawl fishing in inland waters imposed by the Ukrainian legislation also limits their wide use. Therefore, introduction of new tools such as hydro-acoustic surveys in the Dnieper reservoirs, which do not depend on official fisheries statistics data, would improve fish stock assessment and consequently can result in more effective fisheries management.

Close seasons on inland waters aim to protect the natural propagation of the different fish species. A total ban on commercial fishing is established during in springs (usually from the beginning of April to the beginning of June), which lasts for 70 days in the Dnieper reservoirs and may be different in other inland waters.

The traditional scheme of artificial fish propagation in the Dnieper reservoirs is based on stocking mainly two summer old silver and bighead carps and their hybrids, which are characterized by high market qualities and do not form self-reproducing populations in the reservoirs. In order to maintain the needed populations of native fish species (common carp, pike, pikeperch, and sterlet) their restocking was regular in the past (see Box 2.2). Even conservative estimations presented in Tables 2.4 and A1-17 and demonstrate the importance of restocking inland waters with which considerable results (210 000 - # tons/year) #-# % more fish production than today could be achieved yearly.

There is a contradictory situation regarding management of fish stocks in inland waters utilized by commercial and recreational fisheries. Though inland waters of Ukraine are fertile and ideal for highly professional science based CBF management restocking is less focused even neglected by concerned companies and authorities, while fishing is dominated by IUU.

Though this subsector of Ukrainian fisheries industry is the most complicated and overregulated one, still there are basic problems in management and especially in the enforcement of law.

Box 2.2: Restocking program of inland waters and its state support

In Ukraine there are several state-operated fish farms which should restock fry or fingerlings therefore these do not produce table fish only restocking material only. Out of them one farm produce trout (west Ukraine), one farm sturgeon and several farms produces carps (south Ukraine).

According to the official information of State Agency of Fisheries of Ukraine these farms release nearly 9.1 million of fry and fingerlings:

- 7 055 000 (100-140 gr. large) fry and fingerlings of mainly bighead and silver carps and a limited number of common and grass carps;
- 1 358 260 (2-3 gr. large) sturgeons fry of which the commercial fishing is band since 2000;
- 152 840 trout fry, but sometimes these were not native trout, but on the other hand never existed commercial fishing for this species. In addition sport fishing of any trout is not allowed at all;
- 498 730 (max. 0.5 gr. large) fry of valuable native species such as pike, pikeperch, perch, etc.).

Moreover special program “Reproduction” under of State Agency of Fisheries of Ukraine provides and finances restocking activity for Dnieper’s reservoirs and Black Sea’ estuaries mainly. The essence of this activity is to buy fry and fingerlings from private farms and to release them to natural water bodies. Efficiency of this activity sometimes is low: limited species (bighead and silver carp mainly), poor handling with fish, carnivorous fish and sturgeons are restricted because of lack of money and deficit of restocking material. This programme was completely stopped in 2014.

Actual and potential capacities of fish propagation and fish seed supply for inland waters is a key issue of efficient CBF management. Today only bighead and silver carps are considered as species for restocking big inland water bodies, because sturgeon fishing is banned and restocking of others species such as common carp, pikeperch, pike, mullets, etc. are very limited if any.

Regarding waters on which STRH companies operate fisheries, due to lack of financial resources and uncertainties on long term leasing not more than 19.9 million fry and fingerlings, about 30% of needed quantities were stocked by only 190 companies in 2015.

2.4 Inland aquaculture

2.4.1 Pond fish farms

Pond fish culture is the single most important culture system in Ukraine. Dynamics of pond fish culture by region between 2012 and 2016 are presented in Table A1-19.

There are two main types of pond fish farms in Ukraine; non-specialized and specialized ones.

Non-specialized fish farms

A total of 70 000 ha multipurpose small water reservoirs scattered mainly in moderately hilly Central and Western regions of Ukraine (see Box 2.1) are known to be involved in such activity. These waters have never been used for aquaculture as a main utilization. In the past these waters were under the direction of Ministry of Agriculture of USSR. At present these ponds are rented mainly by farmers, i.e. individual persons and private entrepreneurs.

In these waters the main production is two year old table fish; common carp, Chinese major carps and crucian carp. It is estimated that the total production of these ponds vary between 15 000 and 25 000 tons (210-360 kg/ha). Unfortunately there are no reliable statistics on the production of these huge number of non-specialized fish farms. It is estimated that about 80-90% of their fish production is not declared i.e. remain in the “shadow” economic.

The advantages of these ponds that their water supply is only by gravity, their size is not too large and because of the presence of agricultural land there is an internal capability to use own feeds and byproducts, as well as other recourses from the agriculture activities around the ponds.

As there are no specific state regulations and there is no permanent staff/guards and works are done mainly by seasonal workers and because taxes are low the prime costs of fish production are also low. Therefore these type of fish culture could be financially highly competitive.

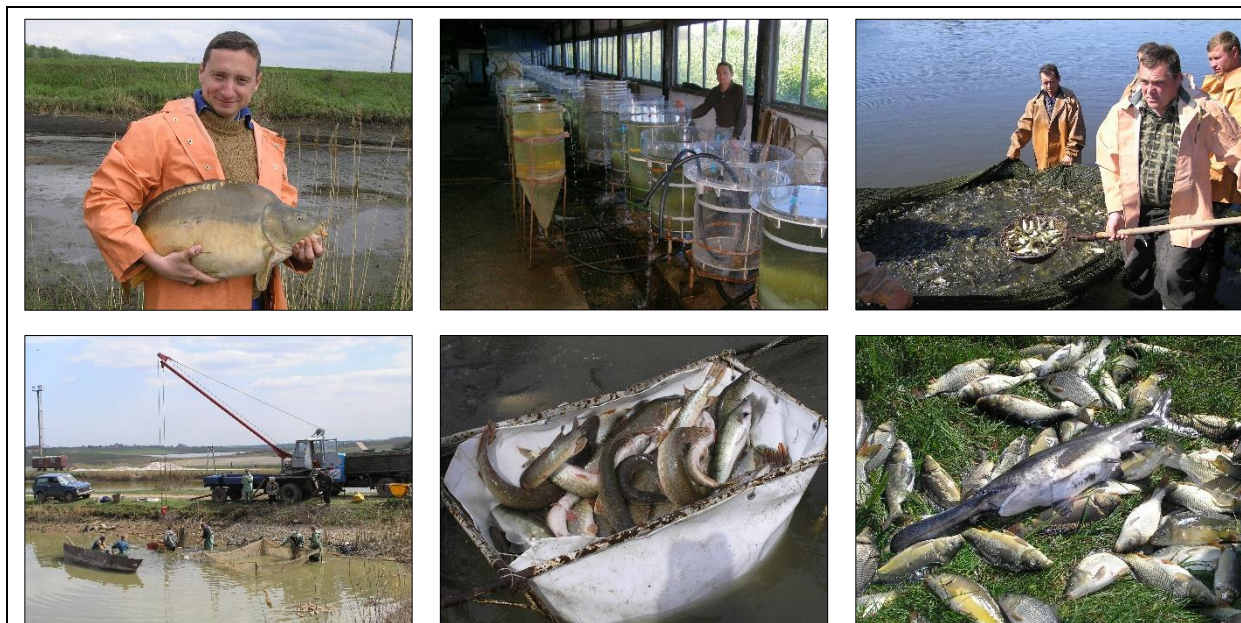
However, as there are neither hatchery facilities nor wintering ponds these farms have to sell all their produced fish in autumns on a low dumping price and to buy fry or one-year fingerlings in spring for higher price, which do not allow efficient market strategy. In these fish farms there are no skilled labor and the management also lack of needed updated technical knowledge, therefore fish production remains low. These fish farms have no state support and there is no any association which would represent them on state level or provide for reliable but affordable extension services.

Specialized fish farms

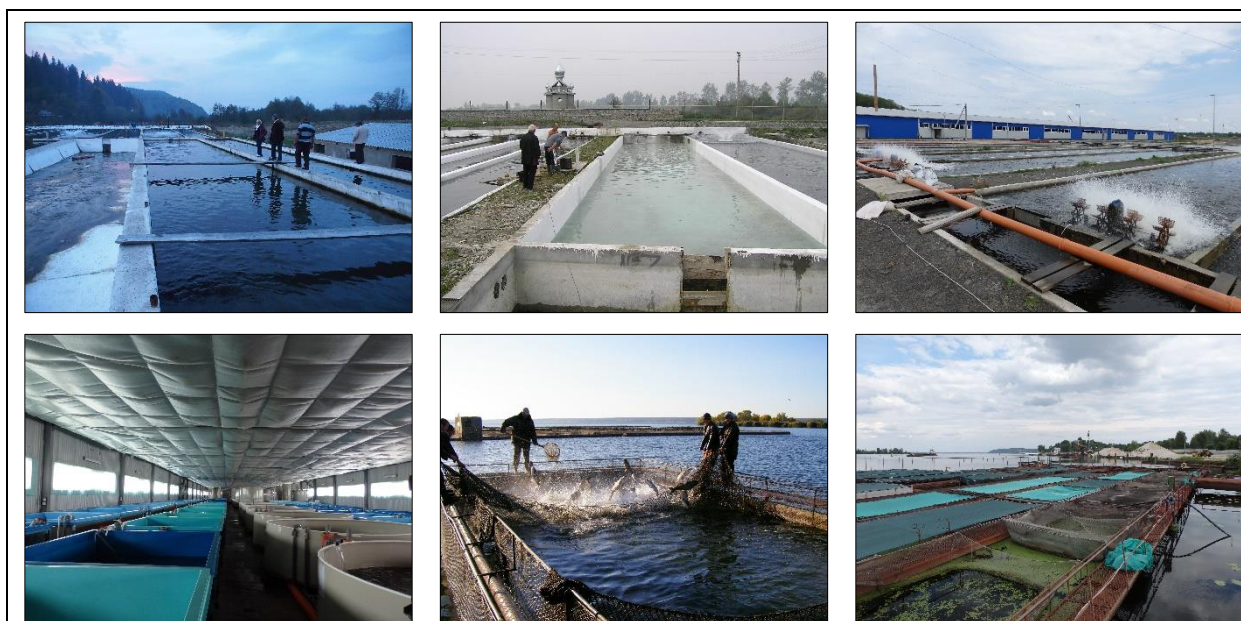
Specialized pond fish farms are listed in Table A1-7. Their total area is 53 125 ha out of which 89% can be drained properly. These were the main freshwater fish producer farms in the USSR time. In the past they were under the direction of Ministry of Fisheries of USSR.

Since the early 1990's these fish farms were reorganized to private joint stock companies but there are still several, not yet privatized state farms. They are scattered more or less equally in the country as the rule in the in USSR time was that there should be at least one big aquaculture enterprise inside each agricultural region. Some of them are huge in one block, but others consist of several semi-independent divisions scattering randomly in the area of the region.

These farms have middle and high level productivity, strong market position, agreements with supermarkets and fish traders and their trade of fish is not so seasonal. the conditions allow the production of middle and high quality fish, out of which table fish is produced within three years. Their total production is between 25 000-35 000 tons (500-700 kg/ha). It is only about 20-30 % of their fish production which remains in the “shadow” economy. The usually produced species are common carp, Chinese major carps (bighead, silver and grass carp), crucian carp, pike, pikeperch, paddlefish, European catfish, channel catfish and tench.



**Figure 2.8: Some of the typical specialized pond fish farms their activities
Brood fish, hatchery facilities and different species and age groups of fish produced in specialized pond
fish farms (Photos by Vitaliy Bekh)**



**Figure 2.9: Tank and cage fish farms in Ukraine
Flow-through and RAS trout and sturgeon farms and cages of carps and sturgeon (Photos by IFME⁵,
Alexander Didenko and Vitaliy Bekh)**

Though these fish farms have hatcheries and a wide range of different ponds suitable for nursing fry, rearing fingerlings and table fish and wintering fish. These have also specialized equipment (for example, trucks and tanks for transporting live fish), but they have no fish feed producing lands. As these are large production units employing skilled labor is feasible.

⁵ Institute of Fisheries and Marine Ecology (IFME)

Fish seed supply

Aquaculture plays an important role in the production of stocking material (see Table A1-11). There are four enterprises in Ukraine that deal with reproduction and fish seed production, which supply young fish for fishery water bodies of Ukraine:

1. State Fish Breeding Plant “Lopushno” (Chernivetskyi region)
2. State enterprise “Kherson Experimental Fish Breeding Plant for Fresh Water Fish”
3. State enterprise “Dnipro Industrial and Experimental Sturgeon Fish Reproduction Plant N.A. S.T. Artiushchik” (Kherson region)
4. State enterprise “Novokakhovskyi Fish Breeding Plant for the Common Fresh Water Fish” (Kherson region)

=>

2.4.2 Tank fish farms

There are # trout farms their total volume is 53 148.9 m³. =>

2.4.3 Cage fish farms

There are # cage farms, their total volume is 31 019.2 m³.

=>

Table 2.4: Declared and estimated actual and potential performance of inland fisheries and pond fish farms in 2015

Type of inland water	Total area (ha)	fish production					
		Declared		Estimated actual		Estimated potential	
		kg/ha	Total (tons)	kg/ha	Total (tons)	kg/ha	Total (tons)
Inland fisheries							
Natural lakes	6 510						
Waters under STRHs	134 378						
Dnieper reservoirs	697 400						
Other large reservoirs	180 930						
Cooling reservoirs	13 500						
Small agricultural reservoirs	536 695						
Coastal waters (limas, firths)	576 147					110	14 800
Canals	#						
Subtotal	#						
Inland aquaculture – know/registered fish farms							
Non-specialized fish farms	70 000						
Specialized fish farms	50 000						
Subtotal	120 000						
Total	#	-		-		-	

2.5 Comparative summary of present and potential performance of inland fisheries and aquaculture

Due to a range of various reasons there are a considerable difference between the present and potential performance of inland fisheries and aquaculture. The situation is more complex if the gap between the two elements of present performance i.e. declared and actual results are compared and analyzed (see Table 2.4).

2.5.1 Declared, estimated actual and potential results of inland fisheries and aquaculture

It can be concluded that there is a huge gap between declared (#% and #%), estimate actual (#%) and potential fish production of inland fisheries and aquaculture.

2.5.2 Inventory of measures for reducing gap between declared, actual and potential results of inland fisheries and aquaculture

In order to reduce gap between declared, estimated actual and potential results some administrative and technical measures should be taken as summarized below.

Administrative measures

- Simplification and enforcement of rules and regulations.
- State support to establish producers associations for proper representation.
- Establishment of reliable, but affordable extension services.

Technical measures

- Detailed survey and analysis of actual fish production in inland water bodies.
- Estimation of sustainable fish production figures in each type of inland water bodies.
- Estimation of yearly needed quantity of fish seed (species, size, type of water body, etc.).
- Outline of needed measures regarding increasing fish seed production capacities.

2.6 Conclusions and recommendations

The followings can be concluded and recommended regarding commercial and recreational fisheries and fish production on non-specialized and specialized fish farms.

Reliable updated key information of surface inland water resources are missing:

- At present relevant data are approximate. List of fish farms is at least 10-15 years and there are only rough estimation on their production.
- All of the more or less reliable information about lakes, reservoirs, limans and rivers are from 1990 and restocking figures were calculated in that time⁶.

⁶ For example it is known that there are 13 500 ha of cooling waters from USSR time, but there is no list of them which includes their dimensions. The same is true for smaller reservoirs, lakes and those waters STRHs operates. Even list of biggest natural lakes and limans in science literature contents mistakes and/or are incomplete. For example the huge Molochnyi Liman is missing from Volume 3 of Geographic Encyclopedia Ukraine compiled in 1993.

- In order to estimate sustainable fish production potentials of surface inland waters it would be very important to group them on the basis of their physical, chemical and biological qualities and their main use/utilizations.

Issues in relation to fish ranching (CBF) on large inland waters are:

- Many fishing companies are performing fishery activities in the same large water reservoirs without clear territorial divisions.
- Fishing companies must pay the tax for “special using of aquatic living resources” which depends on fish species captured.
- This subsector of Ukrainian fisheries industry is the most overregulated and has the biggest problems in legislation, management and especially in implementation i.e. enforcement of relevant laws and regulations.
- At present it is only bighead and silver carps which can be considered as fish species for fish ranching in large water bodies. Sturgeon fishing are banned, restocking of others species such as pikeperch, pike, mullets etc. are very limited if any.
- There is poor coordination, cooperation between all stakeholders especially between commercial fishermen and anglers.
- Poor management at state and local levels including fishing control authority.
- High level of poaching and UUI fishing.
- Financial resources of the government for proper restocking are missing, still financial resources of the private sector (fishing companies and fishers) are not involved.
- There is a high dependence of science or research institutions from state authorities, but these institutes are not properly used and exploited due to the lack of financial resources.

Issues in relation to fish ranching (CBF) by STRHs are:

- Often there is not transparent procedure of establishment STRH regime at state and local level.
- High level of poaching and IUU fishing but generally less than in big open waters because there is only one user instead of many as in case of large water bodies.
- Poor communication between stakeholders and lack of cooperation and representation.
- Lack of financial resources for significant restocking, as private companies prefer not to invest in this because of unpredictable state policy (i.e. the free of charge licenses can be withdrawn easily).
- High dependence of science or research institutions from leaseholders who pay for the compulsory “scientific justification” needed for submission fish production plans. As there is no enough money for paying reliable and proper consultants, fish production plans remain unrealistic. It is in spite that fish ranching in water bodies with STRH regime has a rather positive trend, because fish can be produced without feeding.
- State Register of fishing water bodies and their parts has been just started to be updated, therefore there is still no information for stakeholders (<http://fish.hd.kiev.ua>), but will be completed being ready for providing for all the necessary information.

Issues related to non-specialized fish farms are:

- There are no wintering ponds, no hatcheries therefore these farms are exposed to seasonality, as well as to other fish farms through fish seed supply. Forced marketing causes weak market position and seasonal fish selling.
- Lack of skilled labor and affordable, but reliable extension services are missing.

- There is no producers' association representation on state level.
- Pouching is intensive and fish farms do not receive enough legal defense.
- Leasing procedure of waters is not transparent⁷.
- Improving fish quality, diversification of fish species would be important.
- Improving market chain by cooperation with others farms is required.

Issues related to specialized fish farms are:

- Legislation about property is confusing⁸.
- Financial resources for big investment and development are missing.
- Not the most suitable, profitable and updated technologies are used.
- There are custom duties for import feeds.
- Low customer demand for expensive fish species.
- There is no enough level of legal defense of private property.
- It is difficult to establish new farms as getting permissions is difficult.

Sustainable potentials of Ukrainian inland fisheries and aquaculture are:

- Fish is very important and fish consumption will grow fast as soon as people can afford it. Live fish and local fish after processing could gain strong market position even against import.
- Ukrainian potentialities for the different types of aquaculture and fish ranching (CBF) are huge. If all suitable water bodies would be used for CBF and fish farming the total yearly fish producing could be at least 200 000 – 210 000 tons (see Table 2.4) but with advanced management and more intensive restocking even more yearly fish production could be attained in inland waters (see Table 2.5). As this fish would be produced with low prime cost it will be extensively affordable by a very wide range of people.
- Follow basic tendencies in pond fish culture; increase of the size of marketed table fish (1-1.5 kg and above in case of common carp and 2-4 kg in case of Chinese major carps) and adding value by processing (smoking, conservation).
- Increase the share of additional valuable fish species in traditional pond polyculture; pike, pike-perch, European catfish, and in the south – so-iuy mullet.
- Trout production in case of suitable water in mountainous regions could be an realistic alternative of present import.
- Potentialities of different sturgeon species to be produced in ponds, tanks, cages and RAS are quite wide. It is caviar and meat production in cages and tanks, ranching of native species in Black and Azov Seas, pond farming of paddlefish and starlet.
- Other species such as African catfish, channel catfish, arctic char, tilapias, whitefish, peled, grayling, Danube trout, European plaice, mullets and black carp are present in Ukrainian aquaculture (about 1 %) in spite these fishes have good perspective.

⁷ There is no advertisement at local media or no open competition for renting. People who rent a pond are not really interesting to use it for aquaculture.

⁸ Land under water, hydro-technical constructions i.e. dikes are not in private property, which has to be rented from state and so on.

3. MARINE FISHERIES AND AQUACULTURE

3.1 Marine waters and fishing grounds

Marine fisheries of Ukraine are divided into two independent parts (FAO 2004):

- Fisheries in the Black Sea and Azov Sea within the EEZ (Exclusive Economic Zone) of Ukraine and neighboring countries.
- Distant-water fisheries on high seas.

Table 3.1: General economic data of marine fisheries of Ukraine

Territorial waters (Black sea):	24 850 km ²
Shelf area (to 200 m) (Black sea):	77 514 km ²
Exclusive Economic Zone (Black sea):	~ 131 000 km ²
Sea of Azov:	39 000 km ²
Length of coastline:	1 278 km

Source: FAO 2004

It has to state, that, according to Ukrainian-Russian agreements, the Sea of Azov is not delimited for Ukrainian and Russian parts. Therefore, the all area of the Sea of Azov (excluding 12-miles territorial waters) is be the area of fishing activities of Ukraine, as like as of fishing activities of Russian Federation.

3.2 Marine fisheries resources

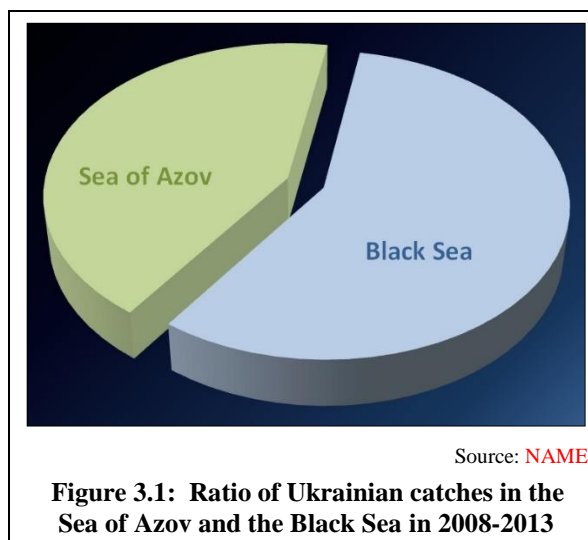
There are 113 different marine fish species in the waters of Ukraine. Within these marine species 48 are important as commercial and/or game fishes (see Tables 2.2 and A1-9).

3.3 Marine fisheries

As marine areas of habitat and production of valuable species of bio-resources both the Sea of Azov and Black Sea were always very important for Ukraine. Under Ukrainian law, biological resources and the sea bed within the territorial waters are the property of the State. The biological resources in the EEZ and the sea bed are under the jurisdiction of the State and marine areas and the sea bed cannot be assigned as private property (FAO 2004).

Six regions of Ukraine (Donetsk, Zaporizhia, Kherson, Mykolaiv, Odessa and Crimea regions) have access to the Sea of Azov or Black Sea.

Consequently the majority of fishing operations are also conducted from these six regions.



Source: NAME

Figure 3.1: Ratio of Ukrainian catches in the Sea of Azov and the Black Sea in 2008-2013

Marine fisheries of Ukraine in the Black Sea and the Sea of Azov resulted a total landing of 32 649 tons of fish and 1 668 of invertebrates in in 2015. This amount doesn't include the amount of commercial catches (landing) by Ukraine of aquatic living resources in the ocean area, open for fishing. The total landing of oceanic living resources, harvested by Ukraine in 2015, equals 41 725 tons. Therefore, the total landing of fish, harvested in 2015 in all marine waters, was 76 042 tons which is only 30% of results attained in 2004.

Despite the fact, that the Black Sea is much larger than the Sea of Azov, the role of the two seas as sources of valuable biological raw material for Ukraine is sufficiently comparable. During the last several years it was landed about 30 000 and 40 000 tons of commercial fish in the Sea of Azov and the Black Sea respectively.

3.3.1 Fisheries in the Sea of Azov

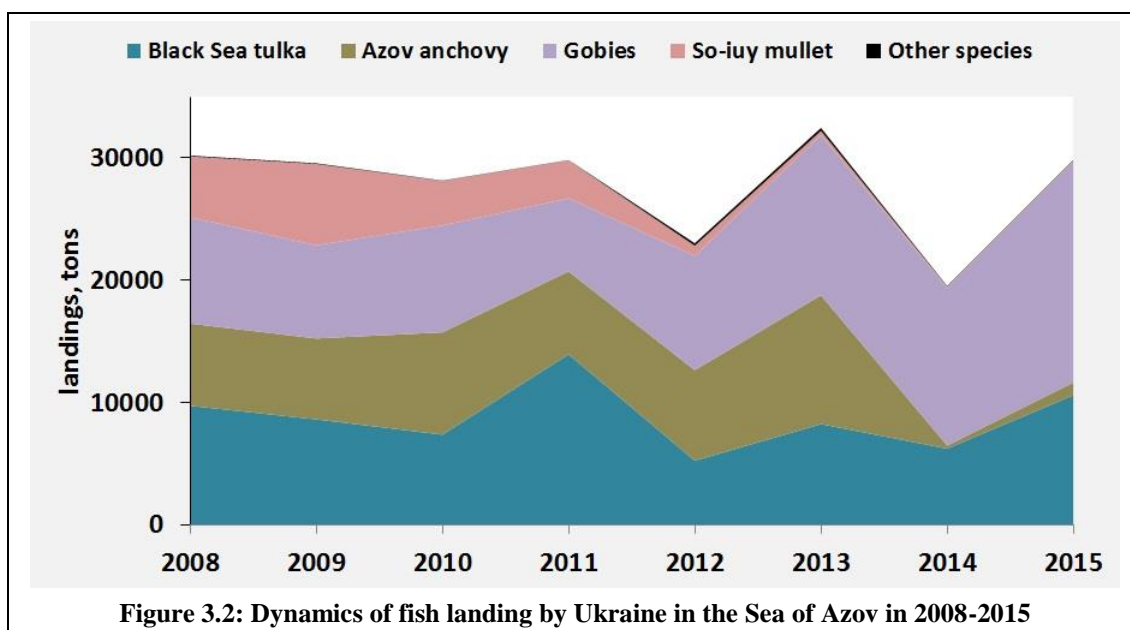
In 2015 the key summary data on Ukrainian fishery sector in the region of the Sea of Azov were as follows⁹:

Socio-economic data

- Number of licensed fishing companies in the Sea of Azov: 99
- Number of fishing companies actually fishing in the Sea of Azov: 65
- Number of registered fishermen on the Sea of Azov: 1 087
- Big fishing vessels (≥ 15 m) (units) on the Sea of Azov: 62
- Small fishing vessels (< 15 m) (units) on the Sea of Azov: 290

Fishing gears

- Midwater trawls (units) on the Sea of Azov: 6
- Gillnets (units) used in the Sea of Azov: 450
- Purse seines (units) used in the Sea of Azov: 30
- Beach seines (units) used in the Sea of Azov: 100
- Danish seines (units) used in the Sea of Azov: 47
- Fyke nets (units) used in the Sea of Azov: 630
- Traps (units) used in the Sea of Azov: 1 000
- Pound nets (units) used in the Sea of Azov: 225



Two regions of Ukraine (Donetsk, Zaporizhia, regions) have access to the Sea of Azov. In 2015 the total Ukrainian landing of fish in the Sea of Azov was 29 850 tons (Gobies 60.5%, tulka 35.5%

⁹ The data does not include Crimea the annexed territory of Ukraine.

and the rest anchovy and mullet) (see Table A1-20). To attain this result midwater trawls, gillnet and different type of seines and fish traps are used as detailed in Table A1-21). Quantity of invertebrates landed in 2015 was slightly more than 400 tons (see Table A1-22).

Planning of catches in the Sea of Azov

Fishing in the basin of the Sea of Azov is conducted on the international base of joint decisions within Ukrainian-Russian Commission on Fisheries in the Sea of Azov, acting according to the bilateral agreements of Ukraine and Russia (1992-1993). Every year the Commission has its regular sessions, where catch limits and its distribution for Ukraine and Russia are established by the joint protocols.

The scientific advice for the next session of the Commission is provided by the bilateral Scientific Working Group consisting of specialists of Institute of Fisheries and Marine Ecology - IFME (of Ukraine) and the Azov Scientific Fisheries Institute AzNIIRKH (of Russian Federation).

Within the different activities of the Working Group, the scientists of Ukraine and Russia analyze the data of the main research fishery expeditions in the Sea of Azov in order to conclude status of fish stocks and recommend catch limits for the next year.

Table A1-23 presents fish stocks and catch limits established for the Sea of Azov by the Ukrainian-Russian Commission of Fisheries in the Sea of Azov in its 26th Session. It is estimated that the total fish stock of commercial fish species in the Sea of Azov for 2015 was about 554 000, out of which, as presented in Table A1-23, 10-27% a total of about 151 900 tons represent the allowed joint limit for Ukraine and the Russian Federation.

3.3.2 Fisheries in the Black Sea

The Black Sea has always been very important for Ukraine, as a marine habitat and as an area of production of valuable species of marine bio-resources.

Four regions of Ukraine (Kherson, Mykolaiv, Odessa and Crimea) have an access to the Black Sea. And, of course, the majority of fishing operations is conducted there.

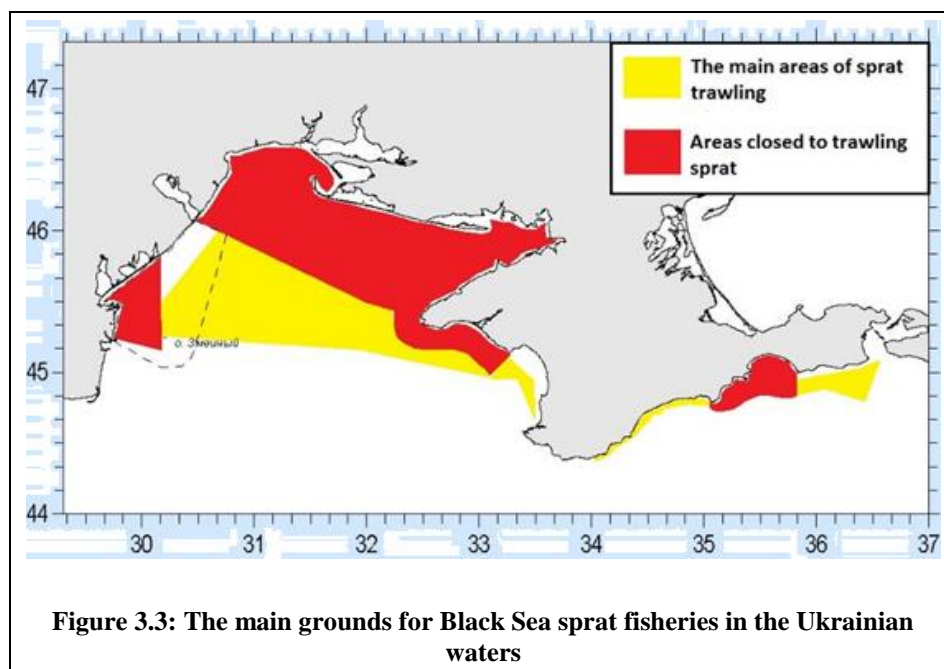


Figure 3.3: The main grounds for Black Sea sprat fisheries in the Ukrainian waters

The main type of fisheries in the Black Sea for Ukraine is sprat trawl fisheries. Figure 3.3 provides the location scheme of prohibited (red color) and permitted grounds (yellow color) for trawl fisheries of sprat, while the list of main permitted types of fisheries for the Black Sea (except for Zones of Integral Protection) is given in Table A1-24.

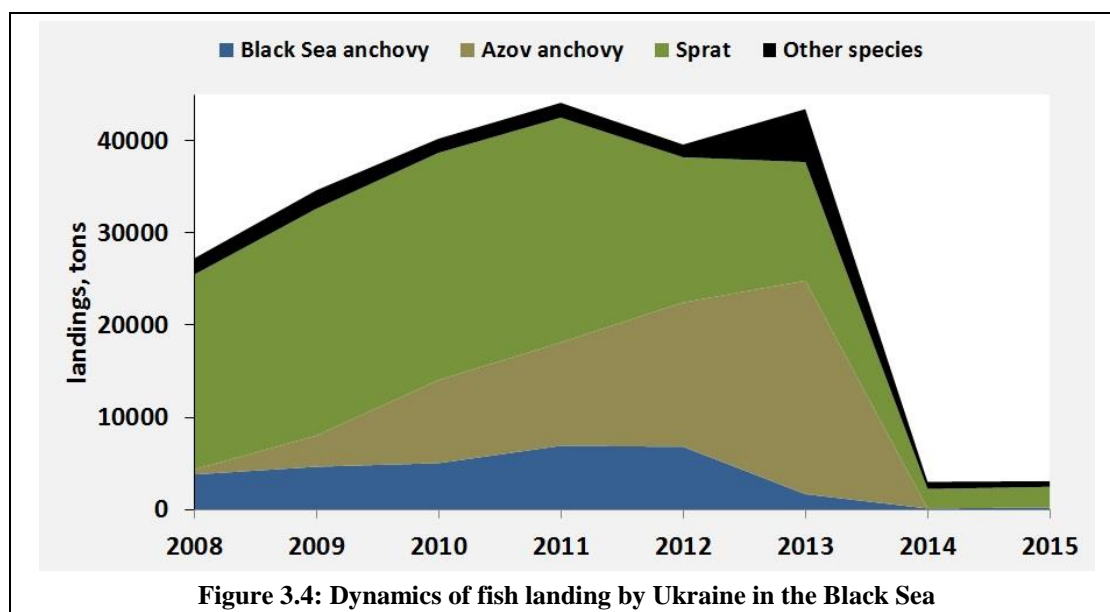
Data on Ukrainian fishery sector in the Black Sea region in 2015 were as follows¹⁰ (see Tables A1-24 and A1-25):

Socio-economic data (see Tables A1-24 and A1-25)

- Number of fishing companies licensed in the Black Sea: 91
- Number of actually fishing companies in the Black Sea: 59
- Total number of fishermen on the Black Sea: 612
- Big fishing vessels (≥ 15 m) (units) on the Black Sea: 9
- Small fishing vessels (< 15 m) (units) on the Black Sea: 213

Fishing gears

- Trawls – pelagic (units) on the Black Sea: 41
- Gillnets (units) on the Black Sea: 9 844
- Surrounding nets (units) on the Black Sea: 88
- Beach seines (units) on the Black Sea: 85
- Hooks (units) on the Black Sea: 32 000
- Pound nets (units) on the Black Sea: 27
- Fyke nets (units) on the Black Sea: 2 585
- Sweep-net (units) on the Black Sea: 91
- Purse seines (units) on the Black Sea: 4
- Lift nets (units) on the Black Sea: 55
- Dredges (units) on the Black Sea: 15
- Other gear (units) on the Black Sea: 74



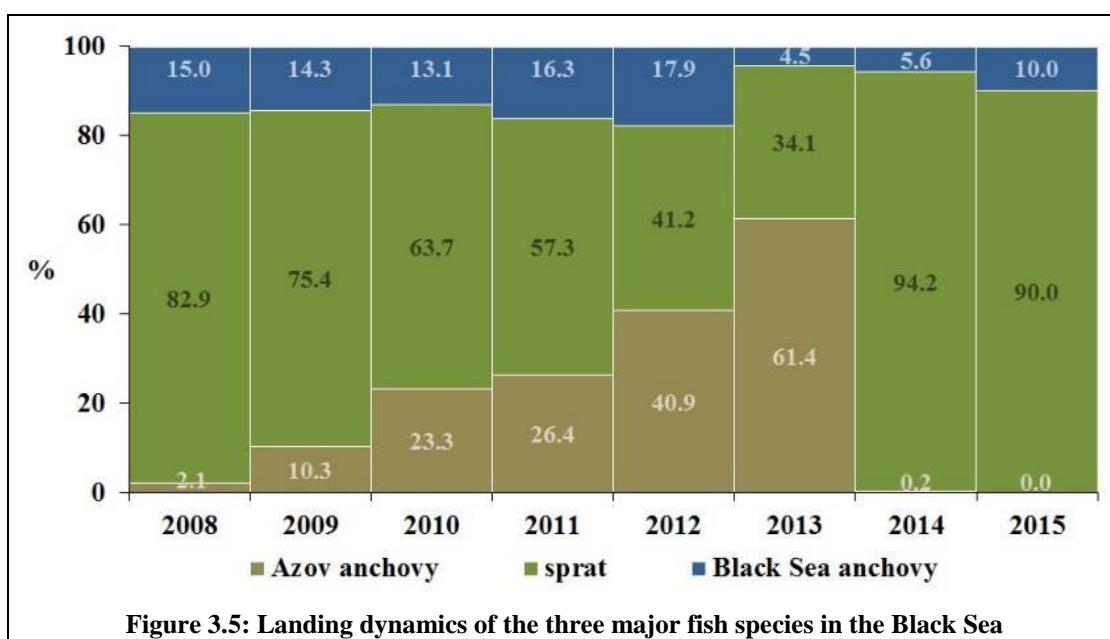
In the last several years before annexation of Crimea by the Russian Federation more than 30 000 tons of commercial fish were landed in the Black Sea. Between 2008 and 2013 the average fish landing in the Black Sea was about 38 200 tons, but fish landings dropped to about 3 000 tons in 2014. It is because this year Ukrainian Black Sea fisheries underwent a significant transformation as a result of the annexation of the Crimea, both in terms of quantity and structure of catches.

¹⁰ The table do not contain data of the annexed territory of Ukraine (Crimea).

During the same period (2008-2014) approximately 94% of the annual landing was composed of the three pelagic fish species: sprat, Azov anchovy and Black Sea anchovy. In 2014 the total amount of landing of these species decreased to 74%, and thus the correlation of these three species was significantly changed. Azov anchovy almost disappeared from the catches (just 4.4 tons were caught), landing of the Black Sea anchovy in comparison with 2013 has decreased in 13 times (from 1686 to 126 tons), and thus, sprat comprised 94.2% of the annual landing of small pelagic species.

Capacity of the Ukrainian fishing fleet does not change: there are no new fishing vessels, only exploitation of the old fishing fleet, the majority of which was created during USSR-years. The most significant cause of this is an overall complicated economic situation of Ukraine as well as unstable political situation, which is not an optimal ground for investment.

The main species captured in the Black Sea were European sprat (80%), European anchovy (about 9%) and turbot (about 3%) of the total catches of slightly less than 2 800 tons in 2015 (see Table A1-26). The outstanding low figures are explained by the fact that at present the main actual problem of the Ukrainian Black Sea fishery is related to the annexation of Crimea because Ukraine. It is because with this the country lost very important fishing grounds. Quantity of invertebrates landed was 1 250 tons in 2015 (see Table A1-27).



Planning of catches in the Black Sea

Fishing in the Black Sea is conducted on the bases of scientific assessments realized by the state research fishery institutions; Institute of Fisheries and Marine Ecology (IFME, Berdyansk) and Odessa Center YugNIRO (Odessa). On the ground of annual research stock estimations together with proposed catch limits are given by the most important species, including endangered ones (see Table A1-28).

3.3.3 Oceanic fisheries

Despite of the long period of slowdown in development of Ukrainian oceanic fishery Ukrainian fishing fleet is relatively active in certain oceanic fishing ground. In 2015 the Ukrainian oceanic fishing fleet had six fishing vessels. First it is the activity of Ukrainian fishing fleet in the Antarctic marine zones of statistical areas 48 (Antarctic Pacific) and 88 (Antarctic Pacific) controlled by CCAMLR. Secondly the statistical areas 34 (Atlantic Eastern Central), 41 (Atlantic Southwest)

and 81 (Pacific Southwest) should be mentioned where the Ukrainian fleet is also acting (see Table 3.12). Two types of fishing gears were used on Ukrainian vessels in the CCAMLR-areas; pelagic trawl (for krill fishing) and longlines (for fishing of toothfish).

Catches on high seas was almost 29 000 tons in 2015 (see Tables A1-29, A1-30, A1-31 and A1-32).

Box 3.1: Present effort on combating with IUU in Ukraine

Despite increasing concern of administration for illegal fishing, real chances of state fish protection bodies to reduce and prevent poaching are very limited. It seems that ambitions and intentions to develop fish protection bodies are not supported by adequate public funding, which would be needed for relevant reforms. The State Agency of Fisheries of Ukraine understands this.

Taking it into account, the agency tries to implement a simple mechanisms of fishery regulations to achieve the effect of deregulation, to decrease the role of state officers for economic activities in fishery. This is intended to minimize corruption risks and to reach a user friendly economic climate.

From the other side, at present there is a process of radical renewal of staff at the state fish protection bodies. It was founded the new state fish protection body, i.e. fishery police, which has significantly higher standards to recruit inspectors. The creation of fishery police is intended to renew the old fish protection bodies.

Unfortunately, the salaries of inspectors in the fishery police is critically low, despite that it is still bigger than the salaries were before. The inspectors in fishery police earn about 200 EUR monthly, while a qualified specialist in commercial sphere earns 3-4 times more. For this reason the new approach to recruit specialist for fish protection bodies does not work well because of the current still poor i.e. unsatisfactory state of funding fisheries protection work.

Today there are no doubt that new technical instruments have to be used for monitoring fishing which can be really effective only together with rational staff policies.

The technical base for fish protection is developing steadily in Ukraine, in accordance with recommendations of the international regional fishery organisations and European Union. It was established that the Vessel Monitoring System (established by Order of Cabinet of Ministers of Ukraine N 963, 28.07.2004) for Ukrainian fishing vessels on base of "INMARSAT".

At present the relevant national legislation is under preparation to provide the traceability of captured living resources all the way along from "water" to "consumers".

A law and connecting regulations are being developed in order to make landings of living marine resources transparent. Accordingly special landing points will be created and maintained, where there will be proper conditions for accountable and inspected work.

It is understood that the success of combat with IUU fishing will be reach as soon as better conditions are created for a more developed legal commercial fishing.

The system should have as many employees as can provide the needed high standards and efficiency. It is why important to focus on the qualitative growth of the system as extensive growth will conserve present problems as without proper social conditions and status employees will not be able to meet the requirements and expectations.

It can be concluded that reforming of the national fish protection system needs provision for adequate financial resources. It is no less important than the international technical assistance and support for the training of inspectors.

3.3.4 Management of fish stocks in marine waters

The factors and issues influencing the management of fish stocks in marine waters are:

- IUU (Illegal, unregulated and unreported) fishing
- Stock management of sturgeons in the Sea of Azov and the Black Sea
- Transformation of fish stocks in the Sea of Azov
- Mass fish mortality in the Sea of Azov
- Acclimatization of haarder in the Sea of Azov
- Decrease of the stock of Azov turbot
- Stock of small pelagic fish (Azov anchovy and Black Sea tulka)

IUU – illegal, unregulated and unreported fishing

Even according to conservative estimations one of the most outstanding influencing factors of the efficient management of fish stocks on marine waters is IUU fishing. It is caused mainly by the poor economic state of people and the critical lack of financial resources for effective enforcement of relevant laws and regulations (see Box 3.1).

Stock management of sturgeons in the Sea of Azov and the Black Sea

The Sea of Azov and the Black Sea are both a habitat of these valuable fish species, of which stocks are currently seriously endangered.

Sturgeons are anadromous species. Their natural reproduction is essentially linked to the largest freshwater water bodies; to the spawning rivers.

Many years ago spawning of sturgeons (Russian sturgeon, stellate sturgeon and beluga) in the Sea of Azov occurred in the upper parts of rivers Don and Kuban'. The "sturgeon" rivers of Ukraine on the Black Sea basin are the Dnieper and Danube.

With the construction of dams and creating cascades of water reservoirs on the Dnieper natural spawning of sturgeons in this river has become impossible. Similar processes also led to the destruction of natural conditions for the reproduction of sturgeons in river Don and Kuban'. Therefore damming of spawning rivers is considered as one of two main causes of the degradation of Azov sturgeon populations (see Figures 3.7 and 3.8). The second one is pouching.

The systematic assessment of sturgeons in the Black Sea was not carried out by Ukraine during many years because of lack of resources. But scientific observations in the North-Western part of the Black Sea allows to state enough frequent occurrence of sturgeon.

According to IFME estimation today the size of the populations the different sturgeons are:

- Russian sturgeon (*Acipenser gueldenstaedtii*) in the Sea of Azov is about 100.000 specimens,
- Stellate sturgeon (*Acipenser stellatus*) - about 50.000 specimens,
- Beluga (*Huso huso*) generally was not registered in research catches last years.

Ukraine and Russia made a joint conclusion (based on multiyear scientific observations) that all sturgeon individuals which are in the Sea of Azov now are from the artificial propagation of sturgeon restocking hatcheries. In fact, the Sea of Azov has become a "pasture" water for sturgeons released by the sturgeon breeding hatcheries.

Until 2009 the fish breeding hatcheries of Ukraine, both state and private, captured matured sturgeon brood fish in the Sea of Azov which were propagated for restocking purposes. Since 2009 all sturgeon species have been included by Ukraine into the national Red Book. Including sturgeons to the Red Book of Ukraine the national sturgeon aquaculture became paralyzed because of the lack of brood fish as these were also banned to be fished. It is only a very complicated and difficult bureaucratic procedure to obtain catch licenses for Red Book fishes, which worsened in the last years. As a result none of the Ukrainian sturgeon breeding hatcheries could obtain license to catch sturgeon brood fish for restocking purposes.

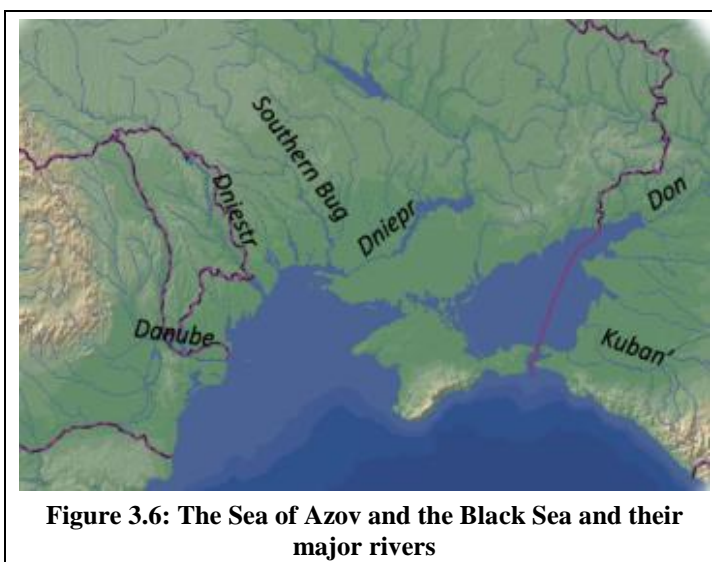
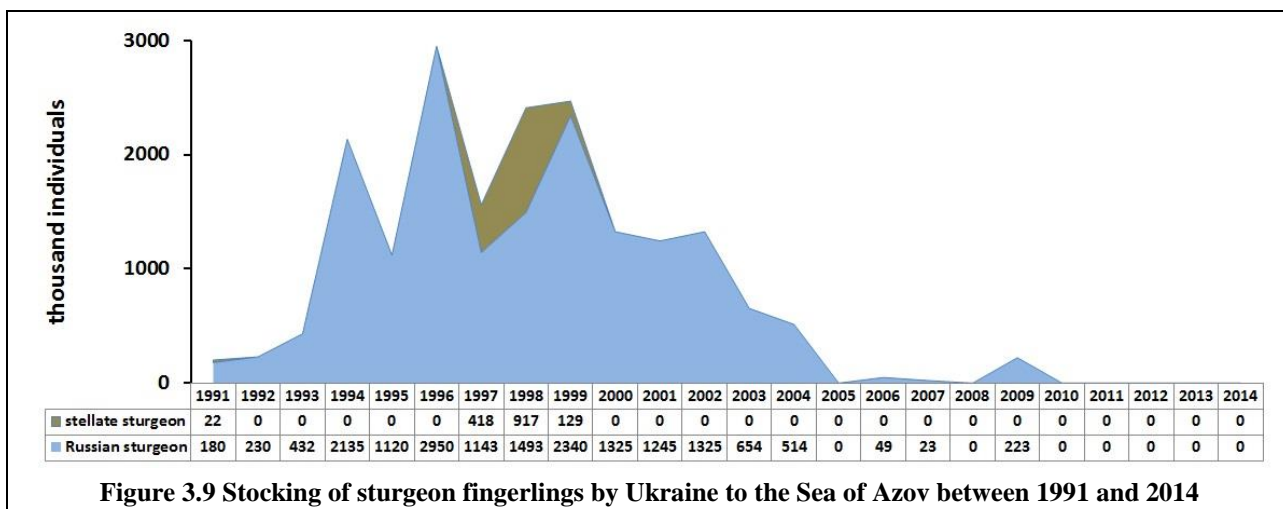
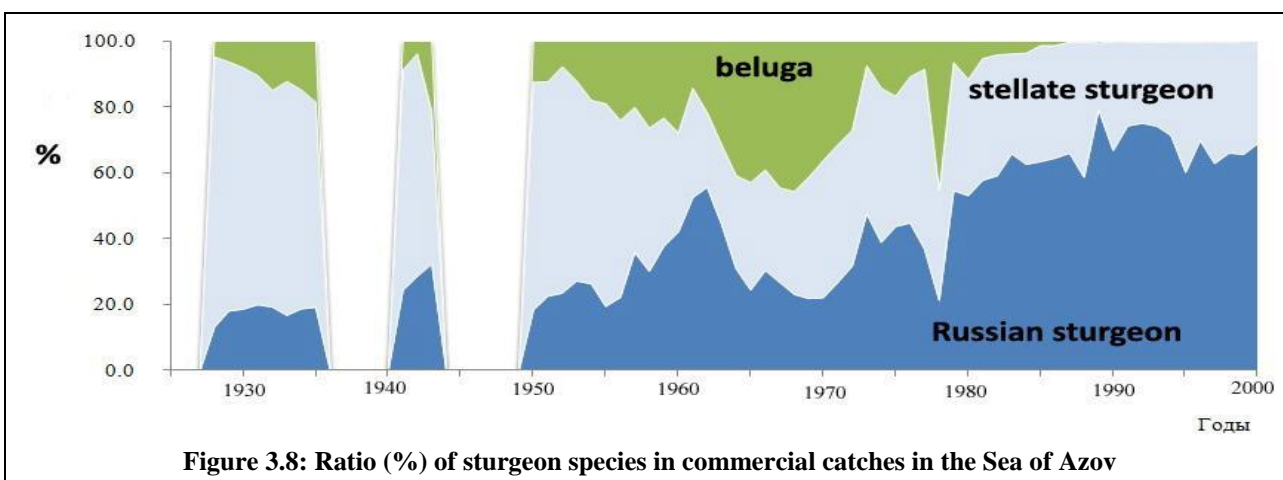
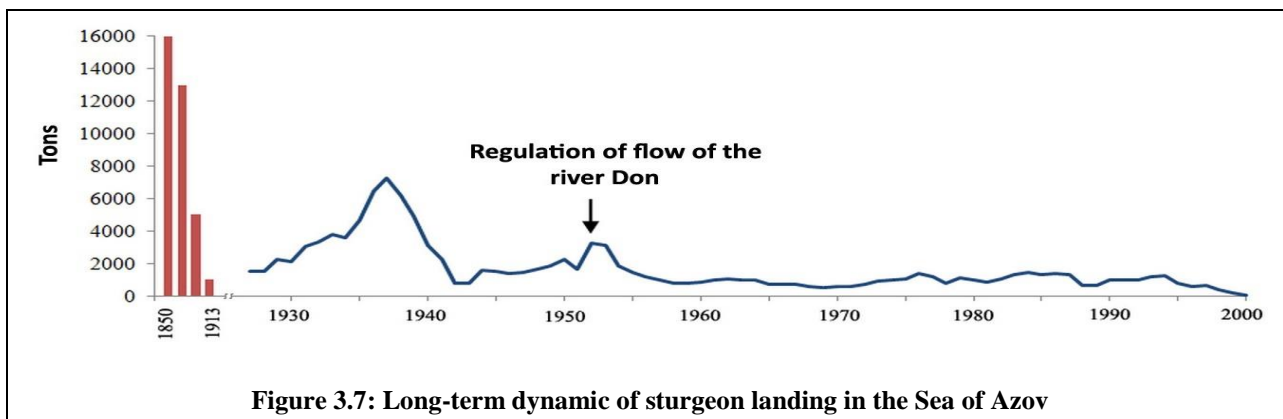


Figure 3.6: The Sea of Azov and the Black Sea and their major rivers

National activities for the artificial reproduction of sturgeons in the Sea of Azov has been stopped completely, and in the Black Sea basin it was carried out only in a very small scale, by using of previously accumulated genetic alive material.



Last years sturgeon fingerlings were released to the Sea of Azov only by the sturgeon breeding hatcheries of the Russian Federation. Actually Russian sturgeon and stellate sturgeon both are not objects of the Red Book of Russia, and Russia has not similar problems like as Ukraine. Only in 2016 Ukraine has released to the Sea of Azov about 200 000 Russian sturgeon fingerlings, using for this the previously accumulated live genetic material. So, it seems, that in case of sturgeons of

the Sea of Azov it was done a mistake to establish radical conservation measure unilaterally, only by Ukraine.

From another point of view, taking into account "pasture status" of the Sea of Azov, the most rational would be to create favorable conditions for national aquaculture for getting guaranteed quantities and qualities of alive materials of sturgeons from the Sea of Azov for large-scale reproduction¹¹.

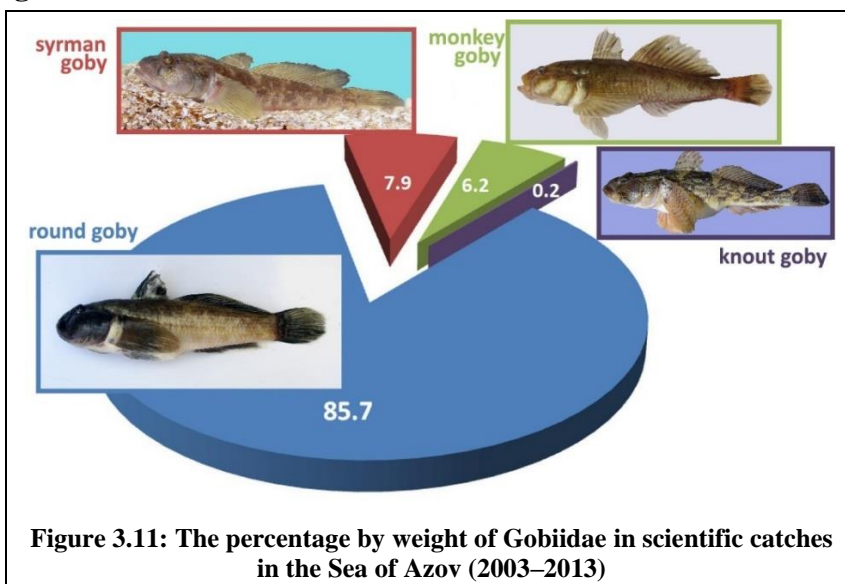
It is needed to be found a feasible solution to change the situation. Therefore it is recommended to consider and complete the below actions:

- Harmonization of the national protection status of Azov sturgeons to the international one, i.e. making it the same for both countries of the Sea of Azov.
- Changing the national permitting system for catch wild sturgeons in the Sea of Azov for artificial reproduction i.e. making it technically non-impossible.



Transformation of the stocks gobies in the Sea of Azov

Since 2012 there has been a rapid decline in catches of So-iuy mullet (haarder). In absolute terms, landing of haarder over the past three years decreased from 833 tonnes in 2012 to 82 tons in 2014. Thus, speaking about the structure of commercial catches in the Sea of Azov, it can be stated that since 2012 the number of the most important commercial fish species for Ukrainian began to decline, due to the lack of exploiting anchovy fishing season.



The most numerous species of Gobiidae family in the Sea of Azov is round goby (*Neogobius melanostomus* Pallas, 1814). In the history of the fishery in the Sea of Azov were the years when the annual landing of gobies reached about 90 000 tons (see Figure 3.12).

¹¹ Instead of this it was created impossible conditions for using savage biological material of sturgeons for reproduction.

The years of the most intensive fishing of Azov gobies coincided with the global ecological transformation of the Azov basin of anthropogenic nature. First of all, it was connected with overregulating of rivers, which led to a change in the water regime of the Sea of Azov. Also landfill soil (in the process of clearing of the shipping channels to the ports of the Sea of Azov) had a negative impact.

Gobies are lithophyte fish for which is needed a solid spawning substrate for effective natural reproduction. Anthropogenic transformation of the sea led to a rapid accumulation of silt that covered most of the available spawning substrate and thereby adequate conditions for breeding of gobies were lost.

Intensive fishing, predation pressure (sturgeons, pike perch, turbot) and loss of spawning grounds have accumulated

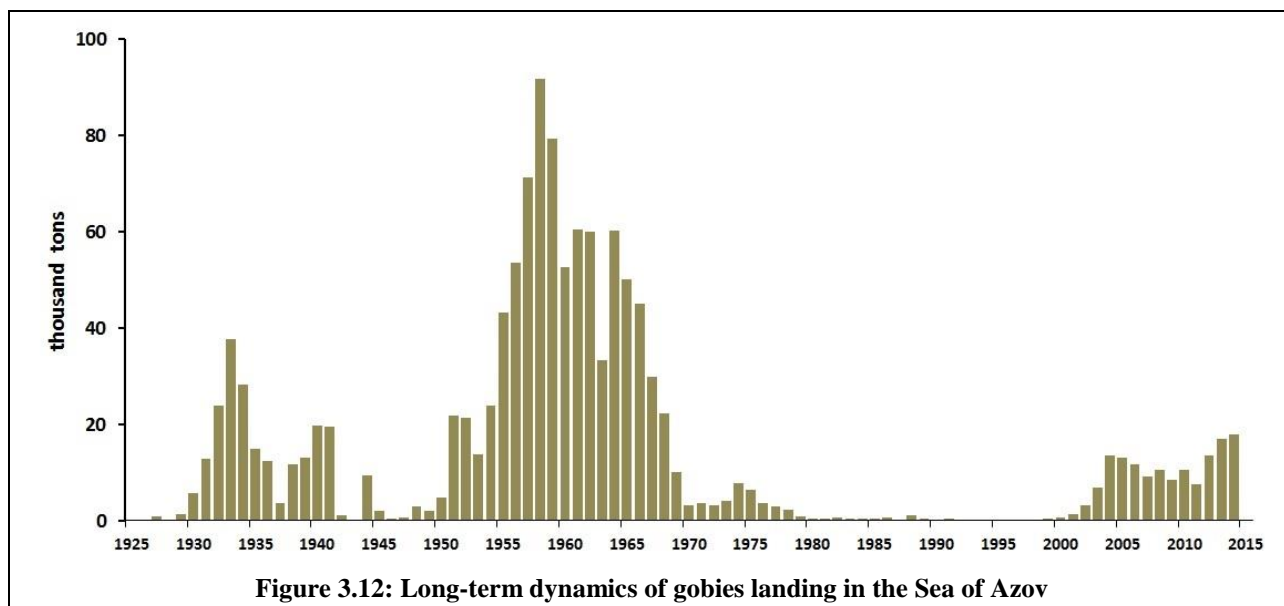


Figure 3.12: Long-term dynamics of gobies landing in the Sea of Azov

But in the case with these species we can observe a very positive example of the successful management of bio-resources by human. Since the late 1980s there were conducted by Ukraine regular restocking works with using of spawning reefs, primarily for the gobies. There have been developed various types of artificial spawning modules, which were tested in natural conditions. The results exceeded all expectations. In the Utlyuksy Bay stock assessment of gobies after 2-3 years of the reef functioning has shown 12-fold increase of the stock on this marine area. Since mid1990s artificial spawning reefs are beginning to install more massively in different bays mainly of the Northern part of the Sea of Azov. Ukrainian fishing companies have taken part in the restocking activities for Azov gobies, because they have to do such work it accordance with Ukrainian fisheries legislation.

As a result, since 2002 fishing of Azov gobies has been renewed after many years of prohibition. In this year (i.e. in 2002) the total limit of their catch was 3.200 tons and their estimated stock was about 10 500 tons. In the last years Ukraine has regularly installed 30-40 artificial reefs in the Sea of Azov annually. Currently in 2016, the total stock of gobies in the Sea of Azov, according to assessment of IFME, is about 130.000 tons. Therefore gobies are now the number one commercial fish object for Ukraine in the Sea of Azov. The efficiency of using the national catch limit on this specie is the highest and exceed more than 90%.

Mass fish mortality in the Sea of Azov

There is one important environmental factor which limits the growth of Azov gobies' stocks. It is the yearly mass mortality of fish on large water areas of the Sea of Azov.

It is because the Sea of Azov is oversaturated with organic materials of natural and anthropogenic origin. As the organic substances in the marine environment is not stable and while their chemical reactions occur the process consume oxygen. At low water temperatures the intensity of chemical reactions (and consequently oxygen consumption) is not so huge, but in warm waters the decomposition of organic materials accelerate hence the chemical processes demand increasingly more oxygen. It is not critical as long as the winds blow steadily and shallow Sea of Azov well mixed from the bottom to the surface, refreshing demersal stocks of oxygen.

The only feasible way to decrease the negative effects of such mass fish mortality and to prevent an ecological disaster in the coastal zones is timely organization of reclamation catches in areas where mass fish mortality developing. Therefore it is required for all fishing subjects on the Sea of Azov to take an active part in reclamation catching, always being ready make salvation of endangered stocks.



However the definite solution would be reducing even stopping pollution of organic materials. Therefore large scale emissions should and fortunately are being more frequently avoided.

Acclimatization of haarder in the Sea of Azov

Haarder (*Liza hematocheilus*) is a species which has been acclimatized and naturalized in the Sea of Azov. Now it is a valuable commercial fish species for Ukraine. This species has been acclimatized in the Sea of Azov in the mid-1970s by specialists of IFME. In fact, work on acclimatization of haarder to the Sea of Azov was executed on Molochniy liman (firth), which area is about 22 thousand hectares.

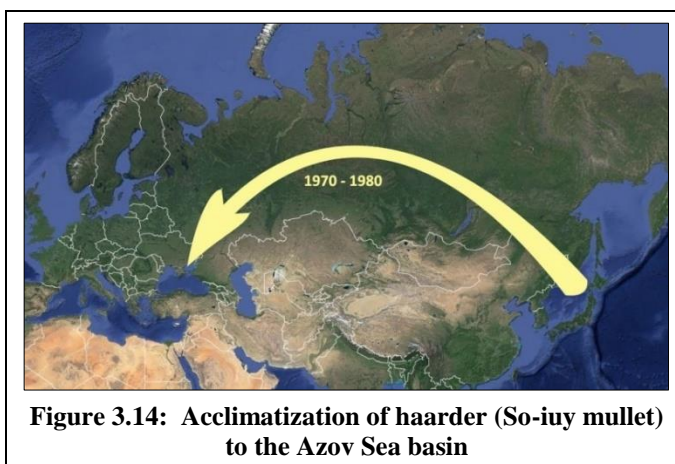


Figure 3.14: Acclimatization of haarder (So-iyu mullet) to the Azov Sea basin

The uniqueness of the Molochniy liman is its higher salinity, in comparison with the

Sea of Azov. If the salinity in most parts of the Sea of Azov is about 10-12 ‰, the salinity in the Molochniy firth in period of the acclimatization work was about 16-20 ‰.

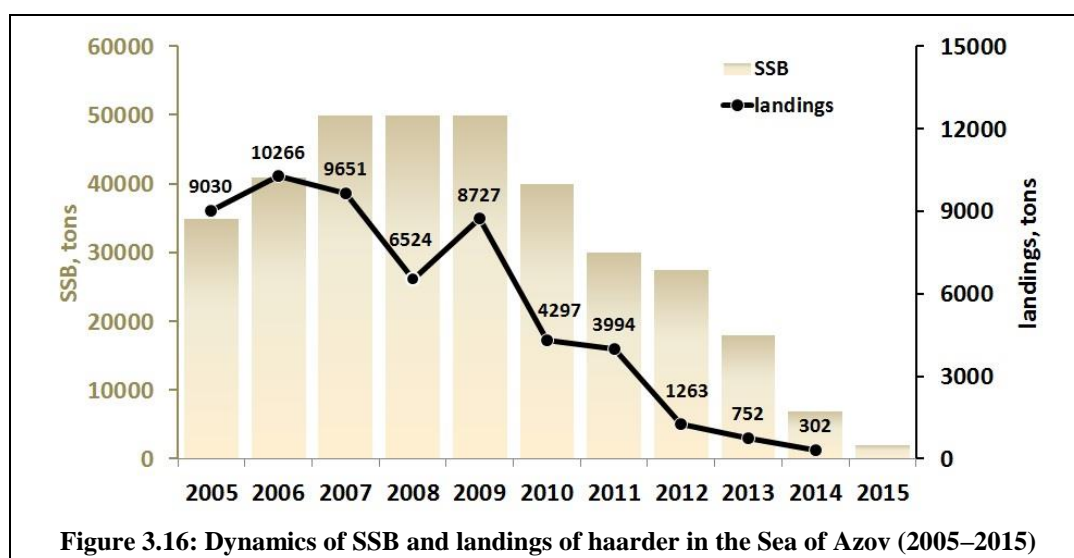
Experiments of IFME have shown that the normal development of haarder eggs occurs while maintaining positive buoyancy of eggs, which is only possible at higher salinity. Close to the optimum for the development of haarder eggs specialists suggested about 20 ‰ salinity.

There was built a scientific-experimental fish hatchery on the narrow channel connecting the Molochniy firth with the Sea of Azov, and there were successfully received the first-generations of the Azov haarder. Haarder fingerlings were released into the Molochniy firth.

1980-90-s were the years of quickly progress for this new species in the Azov Sea basin. Haarder showed very good growth in the new conditions.

The Molochniy liman for many years had the glory of maternal water area for haarder the Sea of Azov. Moving of haarder in spring into the liman was impressive. It was like a massive moving of salmons into spawning rivers. Haarder went into the channel by many thousands of dense shoals of fish, by solid mass.

However, the support of the high bio-productive potential of Molochniy liman always demanded human's efforts to maintain a stable connection between Molochniy liman and the Sea of Azov. Long-term changes of the water regime of the Sea of Azov have led to increased transformation of shores and transfer of large masses of sand along the seashore. The channel connecting the Molochniy firth and Sea of Azov would be closed with sand if not cleaning with special equipment which regularly was carried out to remove the sand from the channel. This work was conducted by one large fishing company that, along with this, conducted fishing in the Molochniy firth (see Figure 3.15).



Molochniy liman, which was previously a hydrological nature protected area where fishing was allowed became the part of the State National Park "Priazovskiy" in 2010 therefore all economic grounds for any fishing companies to continue the maintaining of the channel of the Molochniy liman in working state stopped and the alternate idea to establish at Molochniy liman a state fish restocking complex was not supported. This resulted in sharp decline of the stock of haarder (see Figure 3.16). In our view, including the liman into the national park was a mistake, because conservation of the fish restocking value of this area is possible only with permanent purposeful human activities. Without this the liman will become a hypersaline area with paltry composition of fauna and, of course, it will be lost as the significant spawning area for haarder. After 2010 the channel of Molochniy liman was in working state but later the liman became completely isolated from the Sea of Azov. By 2013 year the area of the liman was about half of its earlier one when it has a normal connection with the Sea of Azov. The salinity of the liman exceeded 40 ‰, and on some areas it reached 70 ‰.

In 2014, in particular due to a strong information campaign, supported by our scientists-ichthyologists and fishing companies of the Sea of Azov, the financial resources for opening of the channel of the Molochniy firth have been found. This gave the result. The liman was filled with water to almost traditional benchmarks (in spring of 2015 water surface area of the firth was about 19 thousand hectares, and the salinity was about 20-30 ‰). There has been registered entry into the firth of haarder mature individuals, and in autumn - going out of fingerlings.

However, the perspectives of the firth is still not clear. In a situation when any fishing in the liman is prohibited. It is regularly needed to find a public funding for maintaining of normal connection of the liman with the Sea of Azov. But it is very difficult in the nowadays political and economic situation of Ukraine.

Our position remains the same: the Molochniy liman should become a state fish reproduction complex, but not a marine protected area closed for any kind of aquaculture and fishery activities. The ground for this is the fact, that the Molochniy liman is now not a nature ecological system which can exist normally without special human interference and maintaining activities.

Decrease of the stock of Azov turbot

Azov turbot (*Scophthalmus maeotica torosa*) is one of the most valuable commercial fish species of the Sea of Azov. Currently, the population of the Azov turbot is depressed, and the value of its commercial stock was estimated being around 90 tons in 2015. It is one of the Azov fish species, which clearly indicate and demonstrates degradation of environmental conditions. It is because over the years of relative desalination of the Sea of Azov turbot's population remained small, despite of the very low intensity of fishing. It only last two years when reproduction of turbot improved because the salinity increased to 13 ‰ (see Figure 3.17).

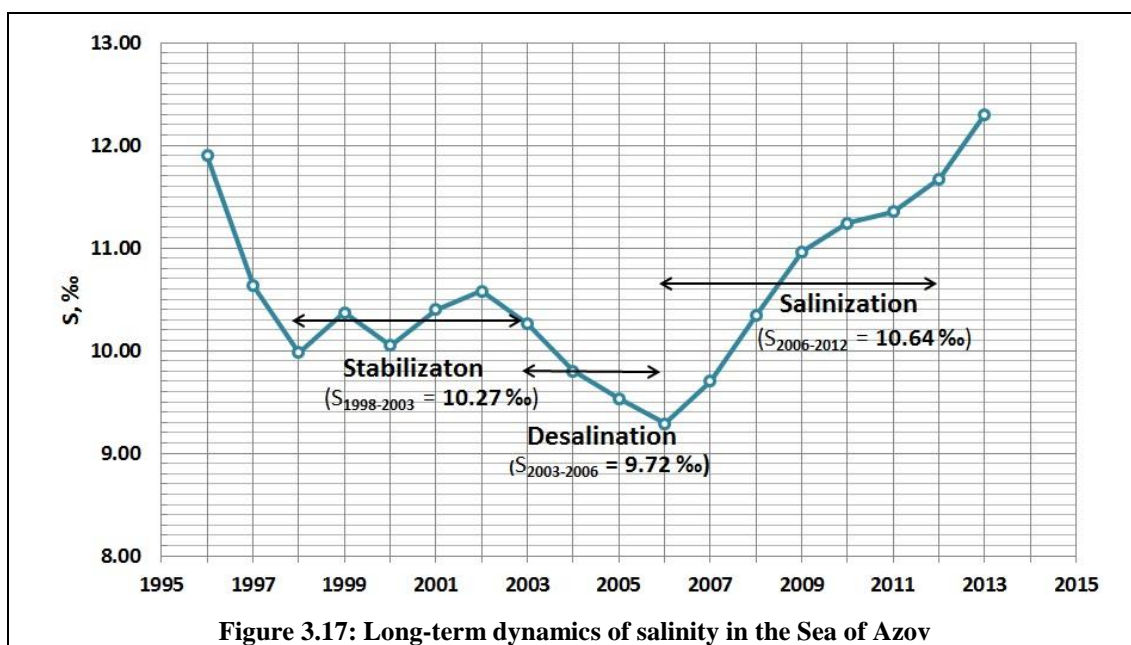


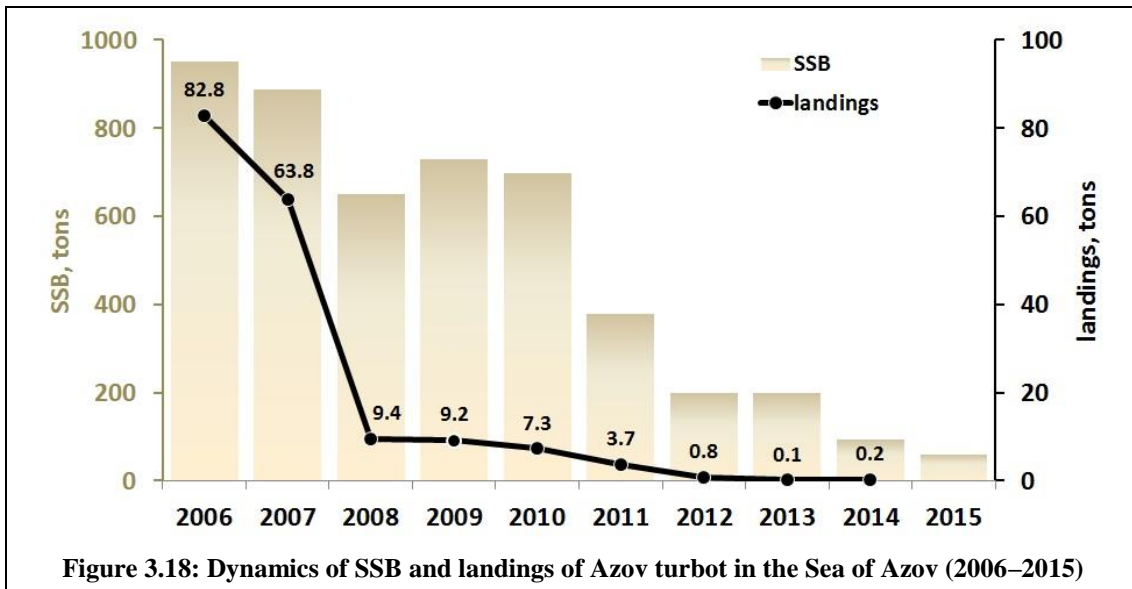
Figure 3.17: Long-term dynamics of salinity in the Sea of Azov

Stock of small pelagic fish (Azov anchovy and Black Sea tulka)

The stock of these mass pelagic fish species in recent years is stable. Anchovy is one of the most important fishing objects and its role is increasing in the Black Sea. Most of the total landing of Azov anchovy occurs in the Black Sea. At the same time the catch limit of Azov anchovy and Black Sea tyulka, annually approved by the Ukrainian-Russian Commission for Fisheries in the Sea of Azov, is often used only partly (less than 50%).

The main global ecological impact reflected in the status of these stocks in the Sea of Azov was expansion of the population of the invasive ctenophore Mnemiopsis in the 1980's and 1990's. It caused a significant food competition for the small pelagic species.

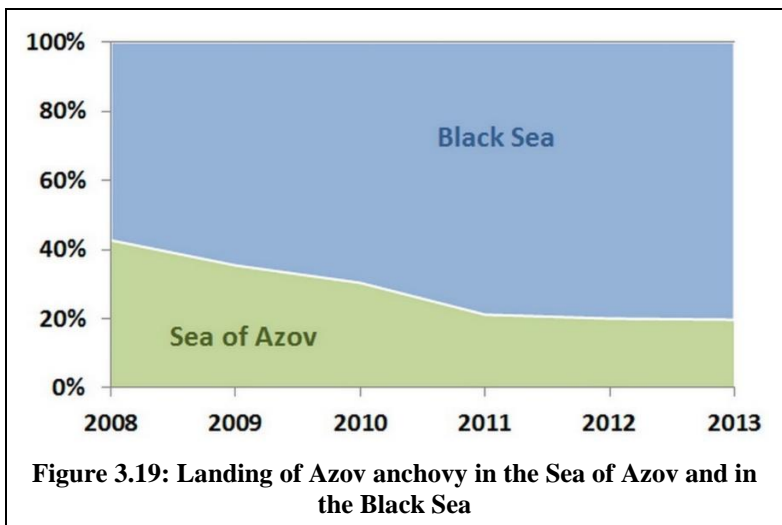
However in recent years the concentration of Mnemiopsis in the Sea of Azov has a local character and at least its role as a consumer of plankton is not dominant.



The one of causes for non-effectiveness of Ukrainian fishery in case of Azov anchovy and Black Sea tulka is very limited (seasonal) period when these fishes aggregate.

The possibilities to catch Azov anchovy were strongly decreased for Ukraine with annexation of Crimea by Russian Federation.

In any case the status of stocks of small pelagic fish in the Sea of Azov is good enough therefore there is available a space for development and investment.



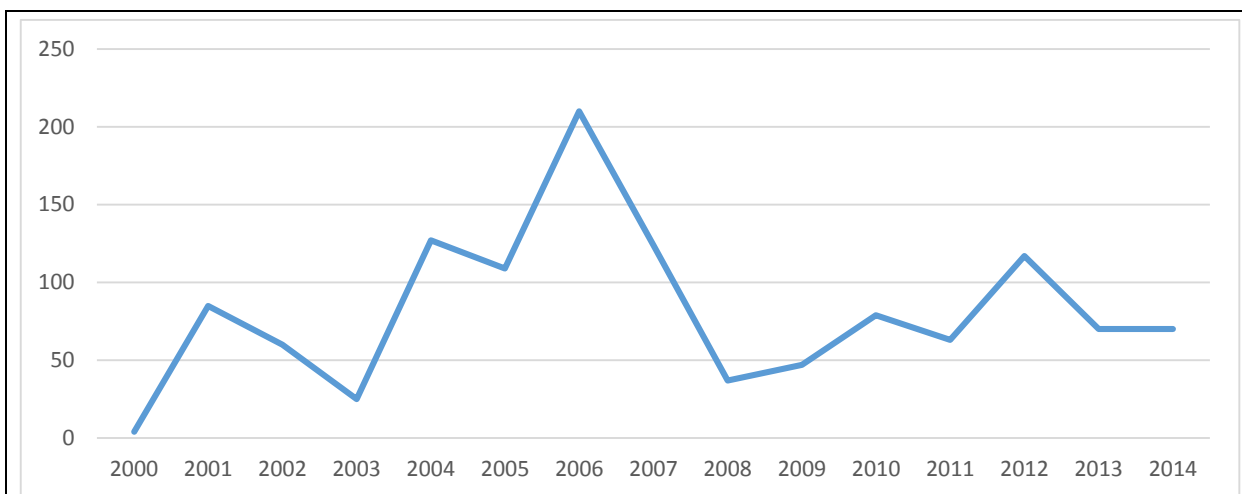
3.3.5 Status of recreational fisheries in marine waters

Recreation marine fishing is very popular in Ukraine, as it is not only recreation but also access to the bio-resources for personal/family consuming. The most popular fish species of anglers in the Sea of Azov and the Black Sea are: gobies (more than 95% of the total recreation catch), Black Sea roach, So-iuy mullet and other mullets, as well as horse mackerel.

The number of marine anglers is very big, but this issue was not studied especially in the last decades. According to rough estimations the total quantity of Ukrainian marine anglers in the region of the Sea of Azov and the Black Sea is approximately 80 000 - 100 000 persons.

3.4 Marine aquaculture

There is no significant marine aquaculture in Ukraine, mainly because of the lack of suitable sites. Perhaps mussel culture should be mentioned of which the yearly production remains below 100 tons in the last years.



Source: FISHSTAT 2016

Figure 3.20: Mussels production in Ukraine between 2000 and 2014

Box 3.2: Future of mussel production in Ukraine

Ukraine plans to [engage](#) in the production of mussels and oysters. Experts believe that at least 20-30 thousand tonnes of shellfish can be harvested annually in the Black and Azov Seas. It has been estimated that the establishment of a farm, which can grow 300-500 tonnes of mussels, will cost USD 1 million. The investment is expected to amortize within three years.

Source: <http://www.eatglobe.com/news/fishing/146-ukraine-to-produce-mussels-oysters.html>

3.5 Conclusions and recommendations

It is important to optimize marine fisheries and aquaculture. It is because the presence and availability of non-used aquatic living resources calls for investments, should receive "green light" supported by the general law reforms and state guaranties for investors.

Providing any advice for development fishery sector of Ukraine it is needed to take into account, that any serious reforming proposal for the fishery sphere go to the state system with critically lacks for public funding.

Consequently every advice have to be based on real available resource for implementation, or to include clear and real scheme of receiving needed financing for multiannual perspective, as long as it is needed to complete the changes.

The above summary is especially important because the fishery sector of Ukraine has enough space for development, taking into account people demand for fish and fishery productions manifested in great amount of fish import optimization of conditions for development of fishing includes:

- General issues
- Development of fishery legislation for facilitate fishing business.
- Management of exploited aquatic living resources
- Combat IUU-fishing
- Restocking of valuable fish species
- Provision state credits for developing fishing companies

General issues

- Organization of fishery and aquaculture separately as one of important national economy sectors in Ukraine;

- Observation of the main principles of the Code of Conduct for Responsible Fisheries FAO;
- Observation of General Principles of CS Fisheries and Aquaculture FAO in development and managing of the national fishery sector;
- Considering that the one of key problems for successful development of fishery sector is critical deficit of public funding, it is needed to do deep analyze of each planned reforming measure before its realization for the effect in situation of critical deficit of resources;
- Presence and performance of high quality staff. Every reform have to be planned in connection with available professionals ready to join to the process;
- Importance of conducting information and awareness campaign for the Ukrainian society on main principles of conservation of aquatic living resources and water ecosystems for people in Ukraine, through schools, universities, TV, press.

Management of exploited aquatic living resources

- To manage exploited aquatic living resources in the water bodies of Ukraine only on the basis of scientific assessment and advice, establishing precautionary catch limits for all species sensitive for anthropogenic impact and changing natural conditions;
- To simplify technical procedures for conducting and developing fishery enterprises in Ukraine;
- To provide assistance to fishery subjects in Ukraine for getting credits and other technical help of the national and international funds;
- To revise the protection status of vulnerable fish species and ecosystems on a regular basis to increase effectiveness of protection measures and fully use the all availabilities for development fishery.

Combat with IUU-fishing

- To implement of Port State Measures Agreement FAO;
- To implement on the national level the law instruments for provide traceability of the all fishery production, sold in Ukraine and exported (using as example EU-directives);
- To revise regulatory rules and regimes of fisheries in the natural water bodies of Ukraine on the ground of scientific advice

Restocking of valuable fish species

- To provide public funding for the state restocking hatcheries for regular producing and releasing into the natural water bodies of Ukraine fingerlings of the valuable fish species (sturgeons, sander, haarder, turbot, herbivorous fish etc.);
- To make alive genetic collections of valuable fish species of the natural populations, for restocking purposes;
- To provide regular activities for increasing of fish productivity of water bodies.
- Development of mariculture, in particular the cultivation of mussels, oysters, seaweed and other objects, although it should be noted that potential opportunities of Ukraine in development of intensive forms of marine culture are limited. The lack of deep bays which do not freeze is a powerful limiting factor especially after Crimea's annexation.

4. SUPPORT INDUSTRIES

4.1 Fishing ports and landing instruments

The coastal infrastructure for Ukrainian fisheries has been significantly changed after the loss of the Ukrainian state control in Crimea. Today Ukraine controls two large fishing ports; one on the Black Sea (in Illichivsk) and one on the Sea of Azov (in Mariupol). But landing of fish is possible at many coastal landing points registered and controlled by the regional fisheries authorities of the State Agency of Fisheries of Ukraine.

4.2 Fishing vessels, gears, devices and equipment

At present there are more than 4 200 fishing vessels in the county which use/operate seven different fishing gears. These large number vessels and gears need continuous maintenance, repair and replacement (Table A1-33).

Generally Ukraine has a well-developed shipyard industry, which can provide a large variety of building and repairing services for the national fishing fleet. These factories listed below are localized on the board of the Black Sea, Sea of Azov and Dnieper. It is need to mention, that in cities where big shipyard are found, there are also many small private enterprises which also offer ship repairing services, but it is difficult to define the exact quantity of such enterprises.

4.3 Fish feeds

There is information only about one large enterprise producing fish feeds in Ukraine - "Dnipro plant of pelleted feed". Information on production of fish meal and krill meal to use in feeds is uncertain. Different private fish farms tried to produce own fish feeds. But most of fish feed for aquaculture in Ukraine is imported.

4.4 Processing and storing of fish and fishery/aquaculture products

In Ukraine fish processing, including canned fish, was carried out by more than 150 companies in 2015. The total assortment is around three thousand items. According to statistics 59 300 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. Fish products were 35 900 tons in 2014, showed an increase of 22 %. Production of fish products in Ukraine in 2015 compared to 2013 has decreased almost 60 %. It is connect with an annexation of the Crimea, where the large fish processing enterprises were located such as LLC "Sevastopolky", LLC "Noviy", LLC "Proliv", LLC "Vostok", JSC "Trading House "Favorit". And the main power of the production of fish products were locate at the Crimea historically.

Production from Ukrainian fish was mainly dried fish, fish jerky and smoked fish made out of marine (gobies, sprat, anchovy, sprattus) and inland fishes (breams, rutilus, Scardinius).

The decrease in fish products production was affected by the Russian import ban on canned fish on 29th of July, 2014, which accounted for 80% (28 300 tons) of total Ukrainian exports of prepared or canned fish and fish products in 2013. Ukraine exported only 3 200 tons of prepared or tinned fish in 2015 while this indicator was almost 35 000 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.

5. TRADING WITH FISH AND FISHERY/AQUACULTURE PRODUCTS

5.1 Fish consumption and market demand

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 significantly importance in nutrition of people.

Wholesale and retail market of fish depend 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 the year 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 (see Figure 5.1).

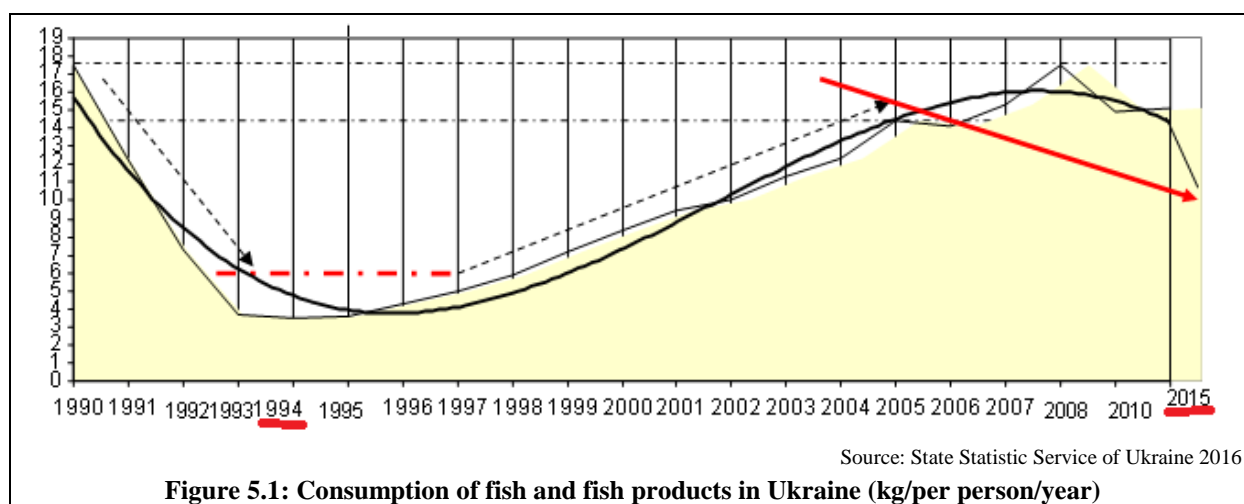


Figure 5.1: Consumption of fish and fish products in Ukraine (kg/per person/year)

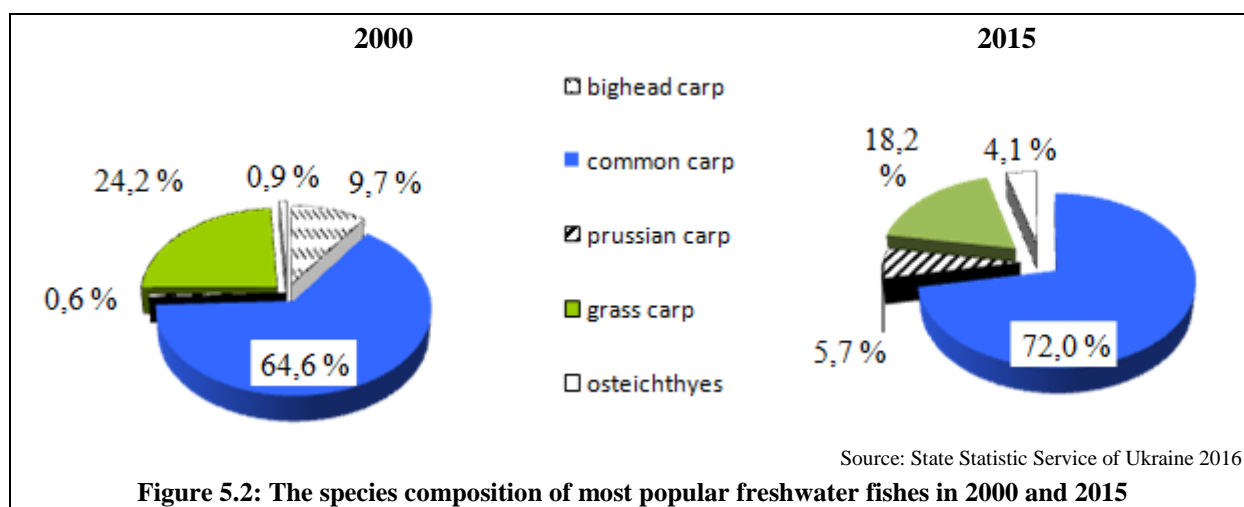
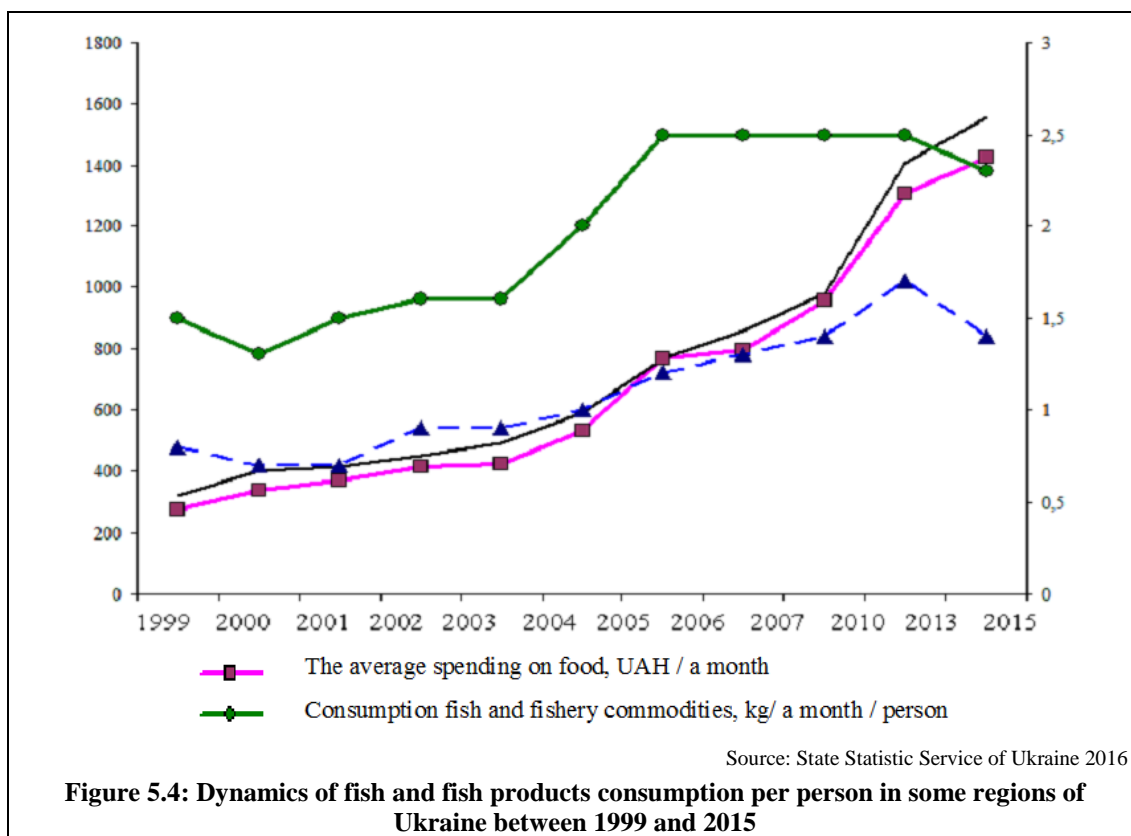
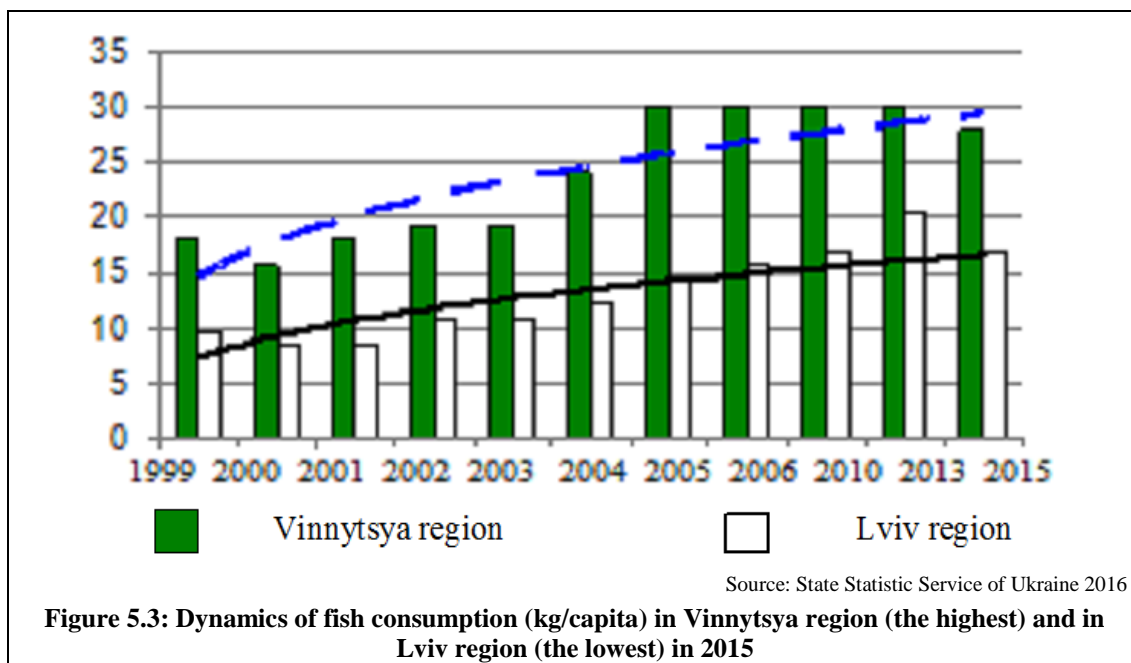


Figure 5.2: The species composition of most popular freshwater fishes in 2000 and 2015

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 and grass carp have the biggest demand among the population (see Figure 5.2).

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 and laminaria (see Tables A1-34 and A1-35).



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 Kremenchug storage reservoir, at the Dnipro River, the Ross River and the Sula River. Figure 5.3 compares those two regions where fish consumption is the highest and the lowest. The differences derive from the fact that the presence of waters (ponds and reservoirs) is significantly higher where fish consumption is also higher.

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 %).

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, etc.) and secondary processing (smoking, salting, marinating, etc.) and packaging of fish products as well as the lack of proper facilities for the cooked fish, which is the most in-demand by the final consumer, are the most obvious obstacles of the development of fish markets in Ukraine.

5.2 Distribution and marketing of fish and fishery/aquaculture products

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 governmental 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 below listed 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:

- 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.
- Individual purchases at wholesale depots. Frozen fish come in boxes, so it is not difficult to take it and store.

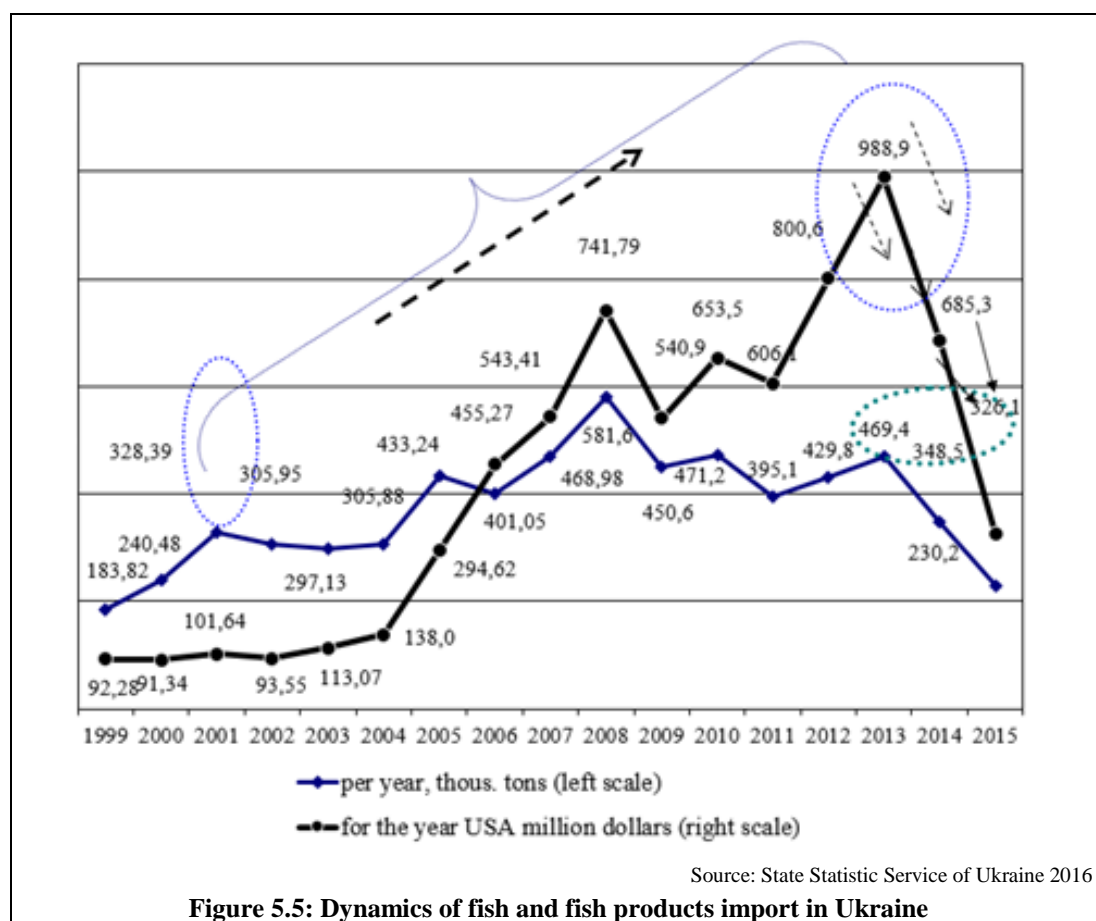
5.3 Import and export of fish and fishery/aquaculture products

5.3.1 Import

The level of dependence of the 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 dependent on imports.

Because of the falling purchasing power of Ukrainians a significant decrease of fish and fish products imports can be observed in 2015. The dynamics of import of the main marketable groups of fish commodities in Ukraine between 2011 and 2015 is presented in Table A1-36.

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 with details presented in Table A1-37.

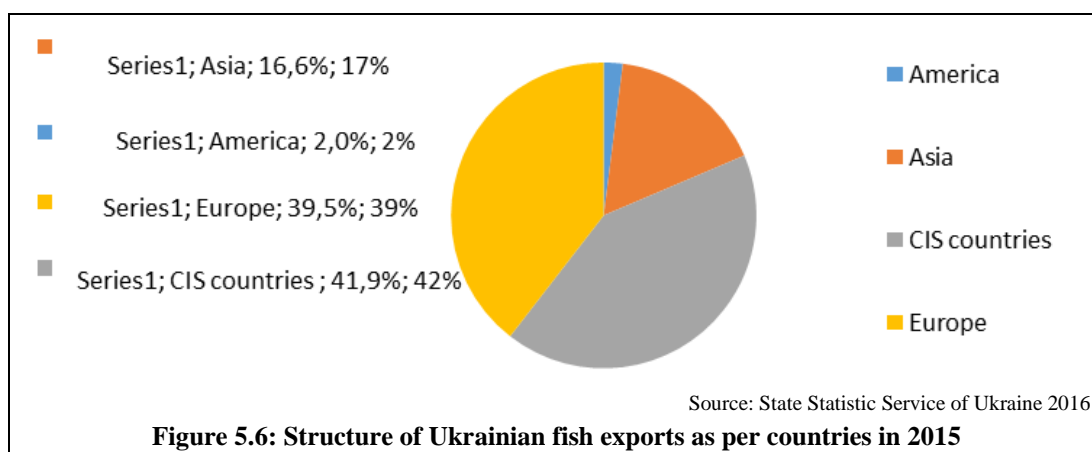


Ukraine has introduced a 10 % import duty in February, 2015, hence fish and fish products were included to the list of additional taxable goods. The introduction of an additional fee has not justified itself, since the budget revenues have declined. Ukrainian fish market has suffered the most. Even despite 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 1st half-year of 2014 is 2 USD/kg, but in 2015 it 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.

5.3.2 Export

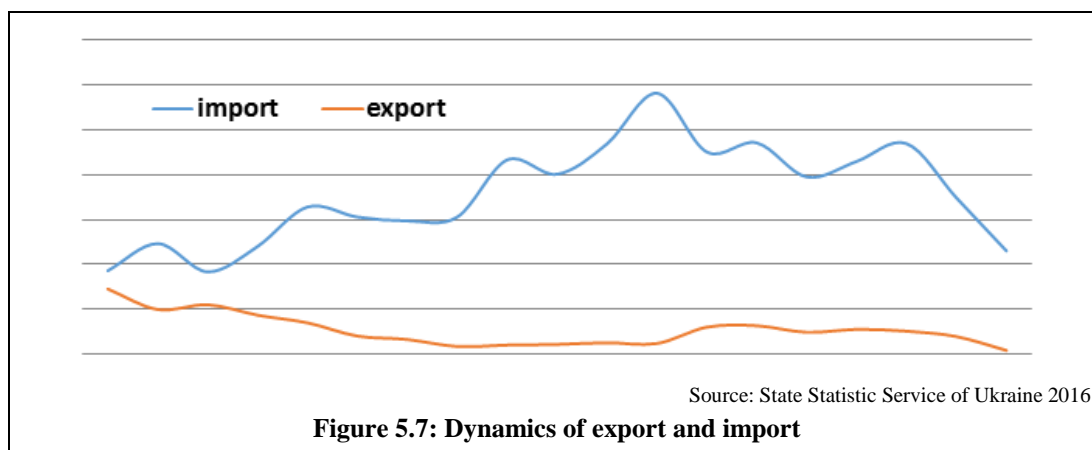
In 2015 a total of 8 600 tons of fish, crustaceans, fish products and other aquatic invertebrates were exported from Ukraine, in a total value of 17.7 million USD (see Figure . This is 31 000 tones less compared to 2014 year when it was 39 600 tons and 42 800 tons less compared to 2013 when the export was 51 400 tons. The dynamics of export of the main marketable groups of fish commodities in Ukraine between 2011 and 2015 is presented in Table A1-39.



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. 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 5.8 tons in a value of 62 900 USD.

The volume of exports of freshwater perch fillets (fresh, chilled or frozen) was a total of 1 392 tons to Europe.

Falling of effective demand due to devaluation of national currency has influenced the reduction of import segment. It is time for import phase-out - saturation of the market by fresh, affordable Ukrainian fish products.



Ukraine has conditions to grow European plaice, rainbow trout, Coregonids, 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.

5.4 Conclusions and recommend

There is a set of actions to be considered regarding fish trade within and outside of Ukraine:

- Support of government and producers/traders associations
- Production and supply
- Fish distribution chain and processing of fish
- Development of market conditions

Support of government and producers/traders associations

- Ukrainian market is still a developing one. A great number of fish and seafood is imported every year; as a result there is a big competition for the local producers with the supermarket chains.
- Program for phasing out import 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, Coregonids, 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 and tilapia).
- Provide enough information to local producers as to fish market situation so that they can use it to their advantage.
- Have to organize the advertising campaign including the assortment's range that has expanded and has deepened by yet unseen species of fish in recent years.
- Have to provide an educational work with consumers through the media and TV.
- It appears 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.
- Need to supply the companies-providers by specially equipped vehicles for transportation of fresh fish.
- Have to inform the consumers about the place of production and placing another additional information, for example, recipes for fish dishes.

Production and supply

- It is necessary to invest into already existing capacities for their modernization. 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.
- Need to expand assortment of fish products through the position of the lower price group.
- 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
- 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 their competitiveness is rather low.

- There are several enterprises in Ukraine that are experimenting with the production of aquaculture objects and use of the new technologies.

Fish distribution chain and processing of fish

- Have to improve the quality of smoked and salted fish, as some entrepreneurs use the shavings to make smoked fish but not timber without tar.
- Need to establish packing and packaging of finished products and semi-finished fish products.
- Need to focus in two fields: modern refrigerators and processing enterprises. The need for modern refrigeration storage capacity for today is about 100 000 tons of simultaneous storage. Fishing in Ukraine is seasonal, that is why it needs the required freezing and refrigerating storage for increasing production capacity.
- To satisfy the growing demand in fish products produced with the new technologies, with fresh materials, packed in convenient packaging and in demand in products that do not need long cooking: filleted fish, fish steaks, surimi (crab and fish sticks).

Development of market conditions

- Have to assess the real situation of the supply and demand balance for decision the measures to protect the domestic market.
- Need to establish of local-level enterprises with mainly small-scale wholesale sales warehouses with a view to approach maximizing fish production to areas of consumption and provide for the needs of urban and rural districts
- Need to extend the network of specialized fish stores.
- Need to open an exchange trade for fish and fish products.
- To develop an infrastructure that is significantly decrease the prices for consumer market and an ability to save the large amounts of products will enable to operators of fish market obtain additional incomes.
- To establish appropriate regional distribution centers, preferably with large fisheries or fish-extraction and processing enterprises that is facilitating the interactions with producers.
- To 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.

6. EDUCATION, EXTENSION AND RESEARCH IN FISHERIES AND AQUACULTURE

6.1 Education

6.1.1 Higher education

Historically i.e. during the Soviet period, major higher education institutions offering diplomas related to Fisheries and aquaculture were located on the territory of Russian Federation¹².

Only one institution of the Ukrainian Soviet Socialist Republic the Kherson Agricultural Institute¹³, where the Department of Pond Fish Farming was opened in 1968 and offered courses in the field of fisheries and aquaculture. This awarded diplomas of Specialists in Zoo-engineering with additional specialization “Aquaculture” to up to 25 graduates every year starting from 1973.

A branch of Kaliningrad Technical Institute for Fishery Industry was opened in Kerch (Crimea) in 1985. In addition, Ukraine had three technical (vocational) schools, which trained aquaculturists in Nemishaivo (Kyiv region, Nemishaivo), Bilgorod-Dnistrovskiyi (Odesa region, Bilgorod-Dnistrovskiyi) and in Mlyniv (Rivne region, Mlyniv).

Special courses in fish farming for employees of state fish farms officially organized by the Kaliningrad Technical Institute for Fishery Industry were offered every year at the Institute of Fisheries of the Ukrainian Academy of Agrarian Sciences in Kiev.

The urgent need in training of specialists for the fishery and aquaculture sector of Ukraine appeared after the collapse of the Soviet Union in the beginning of 1990s, when higher educational institutions, which trained ichthyologists and aquaculturists for the entire USSR, fell outside of the territory of Ukraine.

In 1992, Kerch Maritime Technological Institute was founded as an independent institution. In 1993, Kherson Agricultural Institute introduced the specialty “Aquatic Bioresources and Aquaculture” for training ichthyologists and aquaculturists. However, these institutions of higher education were not able to satisfy the needs of the fisheries sector of Ukraine. Therefore, in 1996, the department of Aquaculture was created jointly by the National Agrarian University¹⁴ and Institute of Fisheries of the Ukrainian Academy of Agrarian Sciences of Ukraine. Later departments were created in several other Agricultural Universities of Ukraine which offered courses and diplomas in the field of fisheries and aquaculture. Detailed list of institutes and courses, degrees and specifications offered by them are presented Table A1-41.

¹² In Kaliningrad the Technical Institute for Fishery Industry, in Astrakhan the Technical Institute of Fishing Industry and Economy, the Far East State Technical Institute of Fishing Industry and Economy in Vladivostok and the All-Union Extension-Correspondence Institute of Food Industry in Moscow.

¹³ Since 1998 it is called Kherson State Agrarian University

¹⁴ Now National University of Life and Environmental Sciences of Ukraine

Box 6.1: System of education and levels of institutional accreditation in Ukraine

Ukraine inherited a Soviet style **system of education**, which is still in transformation. The Law on Higher Education (2002) established three-level structure of higher education; incomplete, basic, and complete educational levels with corresponding educational-proficiency levels of Junior Specialist, Bachelor, Specialist and Master (see details in Table A1-41).

- **Junior Specialist** is an educational-proficiency level of higher education of a person with complete secondary education who has attained incomplete higher education which is sufficient for performing productive functions at a certain level of professional activity on initial positions. The normative period of training takes 2.5–3 years.

This level is considered as incomplete higher education and such diploma entitles to practice a specific profession. Junior specialist diploma are offered by technical schools and colleges.

- **Bachelor**¹⁵ is an educational-proficiency level of higher education of a person with complete secondary education who has attained basic higher education. The normative period of training takes 4 years. Training on educational-proficiency level of Bachelor may be carried out according to the shortened program of studies on the basis of the educational- proficiency level of Junior Specialist.

In most cases, the Bachelor degree has an intermediate character and is considered as basic higher education and is directly followed by Specialist or Master degree programs

- **Specialist** is an educational-proficiency level of higher education of a person with Bachelor degree. The normative period of training takes 1 year.

Specialist diploma confirms the professional qualification in a certain field. This degree have existed in Ukraine since its independence and it was the only first degree in the former Soviet Union.

- **Master** is that educational-proficiency level of higher education of a person who has attained complete higher education, special skills and knowledge, sufficient to cope with professional tasks and duties (work) of innovative character at a certain level of professional activity. Training specialists of Master may also be carried out on the basis of the educational-proficiency level of Specialist. The period of training takes typically 1–2 year.

Master degree is focused more on research and intended for best students. Specialist or Master degree programs are considered final qualifications or complete higher education.

Postgraduate degrees are:

- The **Candidate of Sciences**, which corresponds to the Western PhD, requires a minimum 3 years of research following a Master or Specialist degree in the case of resident instruction and 4 years in the case of distant instruction. This research period is called “Aspirantura” and includes a one-year long qualifying period concluded by examinations, coursework, research and preparation of a thesis and public defense of the thesis. This degree is supposed to be replaced by PhD in 2016.
- The **Doctor of Sciences** is based on a Candidate of Sciences and includes an additional 3 year period of research called “Doktorantura” and includes the preparation and defense of an expanded dissertation. It is required for the position and academic title of University Professor. These postgraduate degrees are awarded by the Higher Attestation Commission of Ukraine.

The form of studies at Ukrainian higher education institutions can be resident or distant, where the latter one usually last one year longer than the first one.

Regarding **levels of institutional accreditation**, In Soviet time vocational and technical schools were considered to be postsecondary institutions and not part of the higher education system. In 1992, the newly independent Ukraine changed this situation by transferring all vocational and technical schools to the higher education system and four levels of institutional accreditation were introduced:

- I. Vocational and technical schools – these train **Junior Specialists**;
- II. Colleges – these train Junior **Specialists** and/or **Bachelors**;
- III. Institutes, academies, universities – these train **Bachelors**, **Specialists**, and **Masters**;
- IV. Institutes, academies, universities – these train **Bachelors**, **Specialists**, and **Masters**, as well as offer **postgraduate studies**.

¹⁵ The degrees of Bachelor and Master appeared in Ukraine after 2005 when Ukraine joined the Bologna Process. According to this process, the Specialist degree was supposed to be gradually phased out by the end of 2009/2010 and replaced by a professionally oriented Master Degree, however, it is still awarded at some institutions. Nevertheless, 2016 is considered to be the last year, when Specialist degree is still offered.

6.1.2 Sector related activities and regulations on obligatory trainings and level of education

There are obligatory trainings and levels of educations which are required for those participating in the management of the sector. These are:

- **Aquaculture** – A specialized diploma in Aquatic Bioresources and Aquaculture is officially required to occupy positions of aquaculturist (fish farmer) at aquaculture enterprises, however, this requirement is not strict. Experience is worth more than diploma. The level of the position depends on the obtained diploma.
- **Commercial fishery** – No specialized diploma is required for commercial inland fishermen. However, a small vessel navigation license is required to drive a fishing vessel. A specialized diploma in “Marine navigation” is required to drive a marine commercial fishing vessel. Special technical diplomas are required for specialists working aboard marine fishing vessels. No special diploma is required for non-qualified deckhands.
- **Fish protection inspectors**¹⁶ – A diploma of higher education is required for fish protection inspectors of state regional fish protection inspections. Although a specialized diploma related to Aquatic Bioresources and Aquaculture is an advantage as well as a diploma in Law or Ecology, other higher education diploma can be acceptable even in disciplines unrelated to fisheries or biology.
- **Fish processing enterprises** – A diploma of higher education in Food Technologies preferably with the specialization in Technologies of Storage and Processing of Aquatic Bioresources is required for technologists, specialists, shift foremen and other positions at fish processing enterprises, canneries, fish processing vessels, etc.

6.1.3 Challenges associated with Fisheries and aquaculture education in Ukraine

Due to the limited number of work opportunities and the relatively low salaries on the fisheries and aquaculture job market in Ukraine, specialties related to these fields are considered as not very attractive and prestigious. Consequently students who enter agrarian institutions and choose these specialties are often not very motivated. It is common when prospective students enter these institutions and choose this specialty after being unsuccessful in entering biology faculties of more prestigious universities. After graduation, currently, only approximately one third of graduates practice their career in fisheries and aquaculture.

Out of the challenges in the Ukrainian fisheries and aquaculture education there some which are especially significant:

- **Outdated facilities and equipment** at educational and research institutions and lack of money to upgrade them or buy new ones. Postgraduate students are often have to use their own financial resources to carry out certain types of research including purchase of chemicals and consumables;
- **A gap between theoretical knowledge and practical training** – It is often difficult for students to get adequate practical training at fisheries and aquaculture enterprises, many of which do not wish to accept interns. Usually, universities have agreements with certain aquaculture enterprises or other institutions for accept students for practical training; however, students often performs unqualified works and do not obtain real practical training;
- **Poor knowledge of English language** in both professors and students in fisheries and aquaculture that does not allow them to use foreign literature and participate in student

¹⁶ Fish Patrol

international exchange programs and collaborate with foreign institutions. Low level of international collaboration with foreign fisheries and aquaculture institutions results in a vacuum in knowledge of new trends and developments in the sector;

- **Lack of technical textbooks** – Most of manuals and course books are outdated and based on old Soviet books and due to the poor knowledge of English language of professors their new course books are based mainly on Russian and Ukrainian language literature including some literature already translated from English;
- Fisheries and aquaculture students usually have very **poor knowledge of biostatistics and mathematical methods** for fisheries related research. As a result, when they pursue postgraduate studies, they have problems with scientific data processing and writing research papers. This is also related to the lack of appropriate manuals on the use of biostatistics, mathematical methods, software for fisheries related research and applications;
- **Lack of access to international scientific literature** – Subscriptions to paid high quality scientific journals are usually too expensive to be afforded by Ukrainian educational and research institutions. As a result, it does not allow the proper follow-up of new developments in educations and research in the sector;
- **Chronic lack of financial resources** at Ukrainian educational and research institutions does not allows postgraduate students and scientists to attend international scientific meetings (conferences, symposiums, etc.) for which the high registration fees are the most disqualifying items;
- **Lack of professors** with specialized diplomas in fisheries and aquaculture at some agrarian institutions, especially at those where the specialized departments were established recently. It is common situation, when fisheries and aquaculture related courses are often taught by specialists in other fields such as veterinary, animal husbandry, etc.;
- **Low salaries of researches and low postgraduate scholarships** do not attract students to fisheries and aquaculture research institutions. It is normally difficult to find motivated students with adequate knowledge for postgraduate studies;
- **Lack of training courses or extension courses for aquaculturists** or those wishing to enter aquaculture business. Especially it concerns trainings in new developments in aquaculture, such as industrial aquaculture, recirculating aquaculture systems, cage fish farming, mariculture and non-traditional objects of aquaculture.

6.2 Research¹⁷

These years fishery researches are devoted to the estimation of stocks of aquatic living resources in waters where there is existing commercial fishing. These researches are realized by three national state fisheries institutions:

1. **Institute of Fisheries and Marine Ecology (IFME, Berdyansk)** is responsible for estimation of stocks of aquatic living resources in the Sea of Azov (with firths) and the Black Sea. At the same time IFME is providing scientific advice to the State Agency of Fisheries of Ukraine for international activities within CCAMLR, GFCM, NAFO, Ukrainian-Russian Commission on Fisheries in the Sea of Azov, CITES, Commission on the Protection of the Black Sea Against Pollutions, Commission of Fisheries and aquaculture in the region of Central Asia and Caucasus. Besides fishery problems IFME is working on aquaculture issues, genetic research, water ecology research.
2. **The Odessa Center YugNIRO (Odessa)** is working together with IFME for estimation of stocks of aquatic living resources in the Black Sea, as well as Danube and Black Sea limans

¹⁷ International cooperations mentioned in this sections are detailed in Chapter 8.3.

(fishes). The institute is active participant on the expert level of work in GFCM, CITES and other Black Sea regional fishery and environmental organisations.

3. **The Institute of Fisheries of the National Academy of Agrarian Sciences of Ukraine** (Kyiv) is responsible for estimation of stocks of aquatic living resources in the almost all inland water bodies of Ukraine, mainly in the Dnieper reservoirs. The Institute of Fisheries during many years closely collaborates with FAO, NACEE and other international organisations, acting in the field of fishery and aquaculture. The Institute is leading national research institution on the field of aquaculture.

In relation to scientific research for fish assessment and scientific advice it is recommended:

- To provide regular national scientific research for fish assessment and scientific advice, which have to be the one of the main elements of fishery management, realized by the State Agency of Fisheries of Ukraine, as the national authority.
- To define needs for scientific staff education. To make and implement multiannual plan for educations of the national scientific staff for fisheries issues.



Figure 6.1: Research on fisheries in Ukraine

Collection of genetic samples (left), Genetic laboratory (middle), and reading chip in marked Russian sturgeon (above right) and sampling benthos (bellow right) (Photos by IFME)

6.3 Conclusions and recommendations

Scientific research for fish assessment and scientific advice

- To provide regular national scientific research for fish assessment and scientific advice, which have to be the one of the main elements of fishery management, realized by the State Agency of Fisheries of Ukraine, as the national authority;
- To define needs for scientific staff education. To make and implement multiannual plan for educations of the national scientific staff for fisheries issues

7. INSTITUTIONAL FRAMEWORKS

7.1 Social/civil societies

7.1.1 *Associations of commercial fishers and aquaculturists*

There are seven regional and local associations of commercial fishers and aquaculturists (see contact details in Table A1-42).

NGO "Association of Fisheries Enterprises of Ukraine" (NGO "AFEU") – It is a young association founded in 2016. It was created for the national level of public activities, to provide legal support and technical help for fishery and aquaculture businesses in Ukraine. The actual number of members (individuals and companies) is nine.

Association "Interregional North-Azov Fishery Union" – It is the biggest fishermen association in the region of the Sea of Azov. At present there are 26 members of the association i.e. fishery enterprises including both big fishing companies and small-scale fishery subjects. Earlier, before the crisis in the Eastern part of Ukraine, this association had about 40 members, much of these now are on the area which is not controlled by Ukraine.

Zaporizhzhie public regional association "Priazovie" – There are 600 individual members of the association. The association unites people conducting activities on the field of fishing industry. In particular the association is working for solution of problems regarding law and in different aspects of using land areas.

Association of producers and exporters of hydrobionts "Aqua-Zoo" – It unites about 14 enterprises, which are harvesting and exporting mainly invertebrates.

Fishery Association "Hajibeiski liman" (Black Sea Region) – This association is managing STRH on Hajibeiski liman which is 10 000 ha. The association gives very good example of effective management though STRH-regime: the total fish landing in the year of founding of the STRH in 2002 was about 240 tons, but last years the total fish landing was more than 1 000 tons. Now there are ten members of the association all of them fishery enterprises both big fishing companies and small-scale fishery subjects.

Danube Association of Fishery Companies – The Association unites 9 enterprises, which are fishing in Danube.

Regional public union of fishing enterprises "BRIZ-2" – The organization unites 6 members i.e. fishing companies and private enterprises. The main function of the organization are to provide support for fishing business in relation to law and legislation and to communicate with state authorities and other NGOs.

There is an association called "Ukrainian importers of fish and seafood"¹⁸

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¹⁸ <http://uifsa.ua/en/2016/09/development-program-in-ukraine-trout-farming/>

7.1.2 Associations of recreational fishers

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7.2 Overall administration of the sector

The key roles of the Ministry of Agrarian Policy and Food of Ukraine, in fishery and aquaculture are:

- To establish and develop the strategy and policy of Ukraine on fishery and aquaculture.
- To provide and legalize law acts for fishery and aquaculture in Ukraine.

Out of the five subordinate authorities¹⁹ of the Ministry of Agrarian Policy and Food (MAPF) the State Agency of Fisheries of Ukraine²⁰ is the responsible organization in state management system of Ukraine. The State Agency of Fisheries of Ukraine (SAF) is the central state authority of Ukraine on fisheries and aquaculture. The activities of SAF are controlled by the Cabinet of Ministers of Ukraine through the Minister of Agrarian Policy and Food of Ukraine.

SAF is responsible for the organization of integrated process of information gathering, analysis, planning, consultation and decision-making. Allocation of resources and enforcement of regulations and rules which govern fisheries activities is also part of the mandate of SAF. The objective of SAF is to ensure the continued productivity of the aquatic and fishery resources and the accomplishment of other sector related objectives.

The main functions of SAF are:

- To realize the state strategy on fisheries and aquaculture.
- To provide control of fishing i.e. ensuring proper sustainable use of aquatic living resources and combating with IUU fishing.
- To organize scientific monitoring of bio-resources in the water bodies of Ukraine and to develop the appropriate conservation measures.
- To provide advice for sustainable development of fishery and aquaculture industry in Ukraine, in cooperation with fishery and aquaculture associations.
- To organize participation of Ukraine in international activities on fishery and aquaculture, as well as to ensure cooperation with the global and regional organizations of fishery, aquaculture and nature protection organisations.

The departments and divisions of SAF are:

Departments

- Department of protection of aquatic bioresources, regulation of fishing and ichthyology
- Special Department "Fish Protection Police"
- Department of organisations of fishery, aquaculture and scientific support
- Legal Department

¹⁹ State Veterinary and Phytosanitary Service of Ukraine, State Agency of Land Resources of Ukraine, State Agency for Forest Resources of Ukraine, State Agency of Fisheries of Ukraine and State Agriculture Inspectorate of Ukraine

²⁰ The Agency is situated in Kyiv (Sichovykh Strilciv str. 45-A). The Head of the State Agency of Fisheries of Ukraine is Yarema KOVALIV. There are two Deputy Heads of the Agency: Pavlo GVOZDENKO (the First Deputy-Head) and Andriy KRAVCHENKO (the Deputy Head).

- Department of finances, accounting and reporting
- Department of fishing fleet
- Department of staff and public service
- Department of the state property, economic development and tenders.

Divisions

- Electronic documents and control
- International activities and European integration
- Informal-analytical issues and contacts with the media
- Technical issues
- Internal audit.

Special small divisions (i.e. sectors)

- Sector of organization of work of the Head and Deputy-Heads
- Sector of administrative services and permissions
- Sector of regime and mobilization work
- Sector of prevention of corruption
- Sector of safety in work

SAF has regional subdivisions in all twenty four provinces²¹ (oblasts), which are structural parts of the organization. In addition there are two special marine sub-divisions, one for the Sea of Azov and one for the Black Sea.

Under SAF jurisdiction there are state fish-restocking hatcheries (#), scientific institutes (#) and other special subjects, **such as ...** for providing main functions of the state for the national fishery and aquaculture. Several of these are fully public organisations. The others are state enterprises being operated by the State Agency of Fisheries of Ukraine, hence they act independently from public budget.

SAF has special advisory councils; "The Council for Fishery" and "The Council for Scientific-Technical Issues". The members of these councils and its regional sections are state officers, scientists, representatives of fishery and aquaculture industry, representatives of professional associations and societies and representatives of other state authorities.

7.3 Statistics of and statistical support to the sector

Statistics and information services play a very important role in sector administration and management if reliable source data and information are provided to all stakeholders. Besides statistics has an important role in the assessment of field potentials and risks, as well as in assessing the economic and in elaboration plans for field support.

Statistical information is produced in Ukraine according to the plan of state statistical reviews and it meets current potential needs of the users and is in compliance with the basic standards for statistical products, being accurate, reliable, timely, punctual, consistent, comparable, understandable and accessible for users.

²¹ Crimea is the 25th region, but it is not controlled by Ukraine.

Statistical information is published on websites of the State Statistics Service of Ukraine (<http://ukrstat.org/en>) and its local territorial departments, and is available to users for free, except for the cases that are stipulated by the current legislation. All users have equal and simultaneous access to the statistical information. Every important change in methodology is reported beforehand.

Box 7.1: The statistical forms²² of agriculture in Ukraine

№ 01 - fish (annually) “The report of aquatic bioresources extraction”
№ 01 - fish (quarterly) “The report of aquatic bioresources extraction”
№ 01A - fish (annually) “Production of aquaculture”
№ 01 - grain (monthly) “Report on the flow of grain and oilseeds for processing and storage”
№ 01 - grape (annually) “Report on grapes processing into wine materials”
№ 01A (annually) Agricultural activities in rural areas “Questionnaire of the basic interview”
№ 02 - farms (annually) “The main indicators of economic activity of the farms and small business in agriculture”
№ 02A (monthly) “The questionnaire of the monthly interview”
№ 02tp (hunting) (annual) “Hunting husbandry performing”
№ 03 - forest (annually) “Forest management activities”
№ 04A (annually) “The area under cultivation of crops for harvest”
№ 06 - village soviet (annually) “Some indicators of village, town and city councils in the agricultural sector”
№ 09B-A (annually) “Adding mineral and organic fertilizers, gypsum and liming soils under the crop”
№ 10 - tech (annually) “Availability of agricultural equipment in the agricultural farms”
№ 11- total (quarterly) “Report on the flow of farm animals to processing enterprises”
№ 13 - total (quarterly) “Report on the flow of raw milk to processing enterprises”
№ 21 - total (annually) “Sales of agricultural products”
№ 21- total (monthly) “Report on the of agricultural production sales”
№ 24 (annually) “The condition of animal husbandry”
№ 24A (monthly) “The condition of animal husbandry”
№ 29A (annually) “Report on the area and gross harvests of crops, fruits, berries and grapes”
№ 37A (monthly) “Report on the sowing and harvesting of crops and the other field work”
№ 50A (annually) “Basic economic indexes of agricultural enterprises”
The register of agricultural producers “AGRO” performing

Subsequent to the results of Adapted Global Assessment of the National Statistical System, conducted by the European Commission and United Nations Economic Commission for Europe (UNECE) Ukrainian statistics is mostly considered adequate regarding the European requirements. The information produced by the state statistical administration is high-quality in most of the state statistical branches, especially in agriculture. According to the assessment of international experts the institutional framework of functioning state statistics in agriculture meets statistical standards, including the basic principles of the official UN statistics.

There is a list of state reporting forms for statistical observations, in particular, there are sections “Agricultural Statistics” and “Fisheries Statistics” (see Box 7.1).

²² The names of tables and reports are given in translation to English from Ukrainian. **Attention!** Failure to give data to the State Statistics Service of Ukraine is punishable by administrative responsibility. **The failure to provide the data on aquaculture is not punishable.** The mechanism and methodology of data collection has been developed. All members should submit data and reports on issues concerning fisheries and aquaculture.

The main data sources are:

The State Statistics Service of Ukraine (<http://ukrstat.gov.ua/>)

The State Agency of Fisheries of Ukraine (<http://darg.gov.ua/>)

The type of reporting:

1. The State statistical reports
 - 1.1. “The report of aquatic bioresources extraction” (annually)
 - 1.2. “The report of aquatic bioresources extraction” (quarterly)
2. The regional reports
 - 2.1. “The report on amount of captured aquatic biological resources“
3. The administrative reports
 - 3.1. “The report № 1A – fish (annually) “Aquaculture production”

Statistics are based on state statistics level. Statistics is collected by the State Statistics Service of Ukraine. Information about fish and aquatic biological resources extractions is collected on the basis of state statistical observation data, which is submitted by enterprises, regardless of size and organizational form. However statistical services does not provide for data on recreational fisheries as today similarly to many other countries in Europe recreational fisheries are unreported.

Collection of administrative information about growth and harvest of aquaculture products is the responsibility of the State Agency for Fisheries of Ukraine. Starting from 2012 the regional departments of the State Agency for Fisheries of Ukraine collect data locally. Consequently the required information on aquaculture is submitted to the territorial authority according to location or place of residence of the respondent, who produces stocking material and marketable fish.

The State Agency for Fisheries of Ukraine collects, assemble, analyze and provide statistical information and informational materials. This is the responsible organization to provide statistical data and information also for FAO (see Box 7.2).

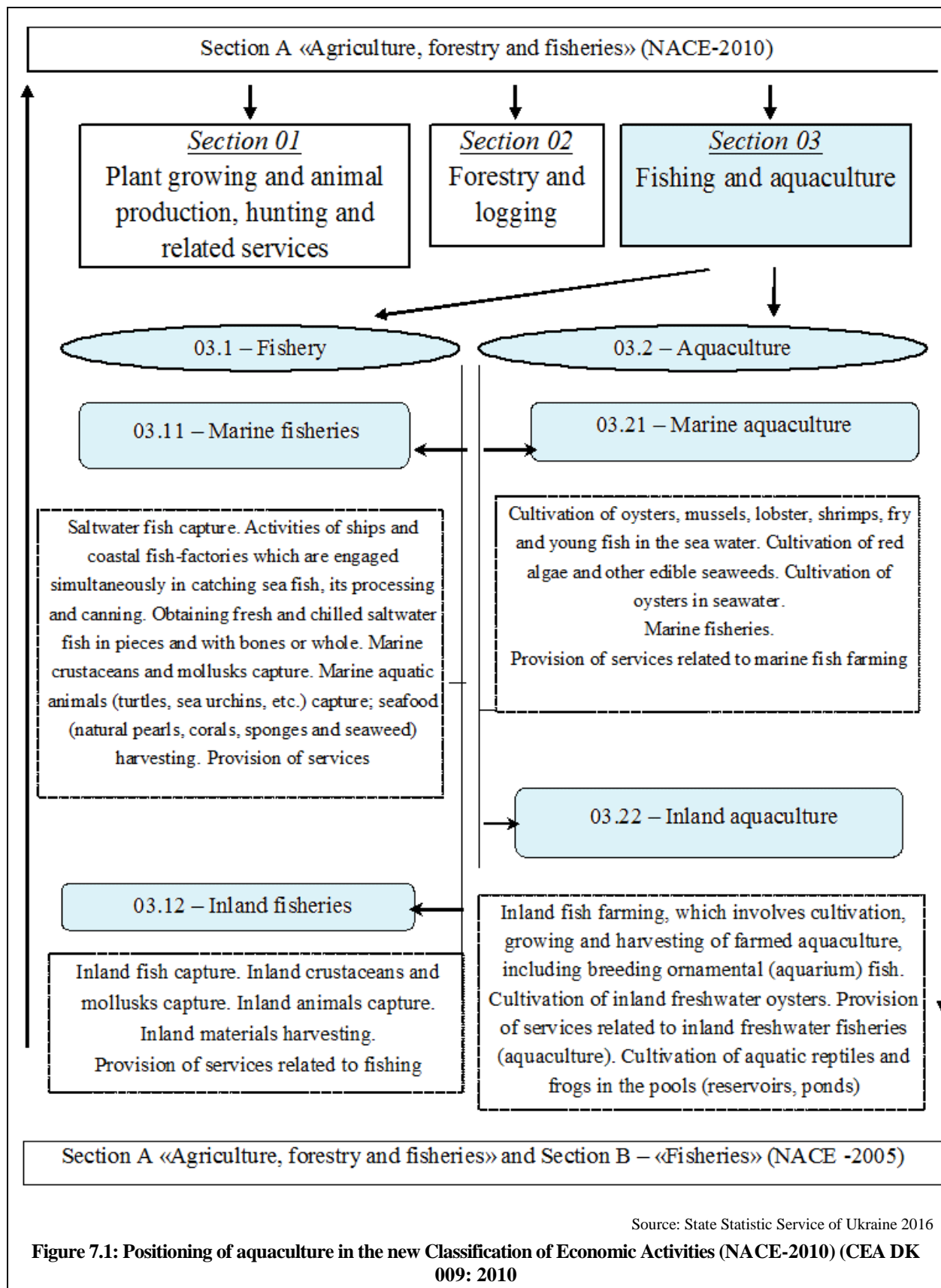
Box 7.2: Statistical data is submitted to FAO in the following forms

- AQ-NS1 – Form is for reporting statistics on fisheries/capture fishery of fish, crustaceans, mollusks, etc. It is done by species, environment and fishing areas.
- NS1 – Form is for reporting statistics on capture production of fish, crustaceans, mollusks, etc. It is done by species items and major fishing areas.
- NS9–Form is for reporting statistics on capture production of aquatic plants, by species items and major fishing area.
- FAO – FISHSTAT FC 1 Form is for reporting statistics on production of fishery commodities.
- FISHSTAT AQ FAO/CWP Form is for reporting statistics on aquaculture.
- FISHSTAT FF-1 Fishery fleet – Number of decked vessels, total tonnage and total power by L.O.A. (Length overall) and type.
- FISHSTAT FF-2 Fishery fleet – Number of undecked, powered and not powered vessels by L.O.A. (Length overall) and type.

Ukraine is gradually adapting the system of governance of national fisheries and statistics to be in line with the requirements of the General Fisheries Commission for the Mediterranean (GFCM) and Scientific Committee on Aquaculture (CAQ) - SIPAM. Summary data is provided by reporting

forms according to the GFCM, Scientific Committee on Aquaculture (according to Recommendation HKRS 35/2011/6):

1. Aquaculture production statistics
2. Aquaculture production centers



Requirement for harmonization of national statistical classifications with their international analogs was done with the sample of the statistical classification of economic activities in the European Community, abbreviated as NACE²³. This contributed to the update of the current system of national statistical classifications of economic activities and production.

The first edition of NACE was developed for implementation of the government program on transition to the international account and statistics system. The purpose of working out the second edition of NACE was to bring it into compliance with EU base of international statistical types of activity classification (DK 009:2005) and revision of certain positions of classification on national level.

The State Agency developed the national version of NACE (DK 009:2010) for Fisheries of Ukraine (see Figure 7.1). Accordingly use of methodical approaches to divide the economic activities in phases allows allocating of three sections; agriculture, forestry and fishery, out of which Chapter 03 “Fishery and aquaculture” consists of two well specified groups; marine and inland fishery and aquaculture. Also a new classification by activity type and types of aquaculture in Ukraine was offered. Before the introduction of CEA DK 009: 2010 fishery and aquaculture were accounted for together in one group, but today they are accounted separately as separate economic activities.

With the transition to international standards in the sphere of fisheries statistics and separation of products and services the nomenclature of fisheries and aquaculture products was developed in 2010. Fish and other aquatic biological resources were divided into 17 groups by industrial characteristics i.e. by their habitat, way/method of extraction, and mode of existence. There are: ornamental fish, ocean and marine fish, inland freshwater fish, anadromous fish, aquatic invertebrates, water plants and animal, pearls, etc. Types of products and services provided by NPRA (Nomenclature of Fisheries and Aquaculture Products) are recommended to use during the creation and improvement of the statistical tools for fisheries statistics and preparing the statistical data to fill in international questionnaires and for carrying out international comparisons.

7.4.1 Fisheries statistics

All concerned obliged to submit statistical data on the amount of extracted aquatic biological resources in the inland fisheries water bodies (or parts), in internal sea waters, territorial sea, EEZ and on the continental shelf of Ukraine. These reports is submitted monthly to local territorial departments of the State Agency of Fisheries of Ukraine.

Fishermen submit the “Report of extracted aquatic bioresources” (annually) and the “Report of extraction of aquatic bioresources” (quarterly) to the State Statistics Service of Ukraine (see Box 7.1).

For timely provision of information on the implementation of control and regulatory functions of protection, usage and reproduction of aquatic biological resources and regulation of fisheries, the territorial fish protection authorities provide information and reports to the Department of Aquatic bioresources Protection, Fisheries Regulating and Ichthyology of the State Agency for Fisheries of Ukraine. These information are:

²³ http://mvplegalgroup.com/view_news.php?id=24

- Limits exploration and prognosis of acceptable special usage of aquatic bioresources and the volume of special usage of aquatic bioresources by users. The deadline is not later than the 10th day of month, following the accounting month (on accrual basis).
- Volumes of fingerlings' reproduction in the natural water bodies and volumes of fish stocking with fingerlings in special freight (trade) fisheries, volumes of fish stockings with scientific and biological purposes and also volumes of fish stockings in CBF. The deadline is not later than the 10th day of month, following the accounting month (on accrual basis).
- Testing fish protection devices, inlets and culverts, about recreational and sport fishing in public water bodies (for inland freshwater bodies) and about recreational and sport fishing in public water bodies (for marine waters). It is submitted twice in a year, not later than the 10th of July and 10th of January.

7.4.2 Aquaculture statistics

To acquire complete information on grown table fish, stocking material and other aquatic biological resources produced in aquaculture are organized. Administrative reporting is done on form № 1A – fish (annually) “Producing of aquaculture”. This form was introduced in 2012, which improved the quality of reporting. Business entities should submit this form annually, but many of them do not comply to relevant regulations, because failure to submit it has no consequences, since it is not punishable as there are no regulations for such action in Ukraine even if all figures of the report have to be mutually agreed, credible and substantiated by the documents that are issued in accordance with legislation. Filling in the report should be done according to the data of specialized forms of primary documentation for companies specialized in aquaculture (see Box 7.3).

Box 7.3: Specialized forms supporting form № 1A – fish “Aquaculture production”

- № A-01 “Act № __ to transfer the replacement stock from group to group”;
- № A-02 “The statement of the availability of the replacement stock (by fish species) __”;
- № A-03 “The statement of the availability of the broodstock (by fish species) __”;
- № A-04 “Journal of obtaining the gender products from broodstock”;
- № A-05 “Journal of observing the eggs incubation”;
- № A-06 “Act № __ the results of the eggs incubation”;
- № A-07 “The statement about spawning results”;
- № A-08 “Act of № __ growth larvae results”;
- № A-09 “Act of № __ breeding live feed”;
- № A-10 “Act of № __ fish stocking”;
- № A-11 “Summary statement of the fish stocking”;
- № A-12 “The statement of the results of the control fishing catches”;
- № A-13 “Act on the fish catches № __”;
- № A-14 “Summary statement of the fish catches”;
- № A-15 “Act № __ the conditional determination of fish amount in the non-fish catch inland water bodies”;
- № A-16 “Act № __ the disposal of the current biological assets of aquaculture (fish death) “;
- № A-17 “The schedule of the descent and the fish catches into ponds, pools, trays and other inland waters”;
- № A-18 “Act № __ of the fertilizer entry”;
- № A-19 “Act of № __ preparation of the spawning ponds”;
- № A-20 “The limit-card for fish feed”;
- № A-21 “The statement of fish feed and feed costs”;
- № A-22 “Act № __ the determination of the fair value of aquaculture products” (fry, larvae, spat, fingerlings, yearlings, rearing stocks, breeders, commercial fish).

Forecasts are important for state authorities, as they allow analyzing the usage of domestic fishery capacities including regulating the market of aquaculture products to correct negative situations at the national or regional markets, which can be formed as a result of unfavorable internal or external conditions.

7.4 Financial support to the sector

At present there no government programs which would provide for financial support for companies and individual professional fishers and aquaculturists.

Loans from commercial banks are available with usual terms in case suitable collateral accepted by bank could be produced.

7.5 Conclusions and recommendations

In order to receive and process more reliable data a new legislation is needed for statistical data collection in fisheries, aquaculture and their support industries, including fish processing and marketing.

In addition there are some important issues which should be considered and dealt with. These are summarized below.

There is no statistical data on recreational fishing:

- It is needed to introduce statistical follow-up and evaluation of recreational fishing by developing new rules and mechanism of accounting all important information related to the subject.

There is an imperfect system of collection and submission of fisheries reporting:

- Should be provided electronic documents circulated circulation among fish protection authorities which could keep a constant on-line communication with concerned stakeholders when fish is captured.

There is no statistical information about marine aquaculture:

- Collection of statistical data of marine aquaculture should be introduced.
- A reporting system should be develop for marine aquaculture, including special forms (questionnaire) of primary documentation that enterprises of marine aquaculture have to fill in.

There is no statistical information on quantities and ranges of marketed aquaculture products:

- The full amount of revenues of aquaculture products sold on domestic market from fish farms should be covered by official statistics.

Quality of reported indicators of fish production and fish products is low:

- It is needed to establish and maintain the list of entities that are engaged in fish production, both in fish seed and table fish production.
- Introduction of improved licensing of aquaculture entities, which would include strong commitments and guarantees for performing correct reporting, as well as for observance of environmental requirements.

- It is needed a legal register, an article in the Administrative Code of Ukraine that would strengthened the administrative responsibility for providing correct data from aquaculture entities.
- Performance level of Fishery Patrol Services which collects reporting data should be improved.

It is missing information on employment related issues:

- It should be develop methodology, mechanism and report form (questionnaire) for collection an information on the employment of workers in fishing and aquaculture enterprises.

Reporting and reports should be improving:

- Improving of the Form № 1A – fish “Producing of aquaculture” for getting information about all commercially important fish species.
- There is a range of economic indicators which are needed for statistical analysis:
 - Income (structure of income realized including subsidies and all other types of incomes)
 - Operational costs including 1) labor related expenditures (types, number and educational level of employees, fees, salaries, bonuses, etc.), 2) cost of production materials (stocking materials, feeds, manure, etc.), 3) repairs, 4) bank expenses (debts), etc.
 - Investments and capital expenditures including capital deprecation (amortization).
 - Income i.e. fish production in both physical and financial terms.

8. LEGAL FRAMEWORK GOVERNING FISHERIES AND AQUACULTURE²⁴

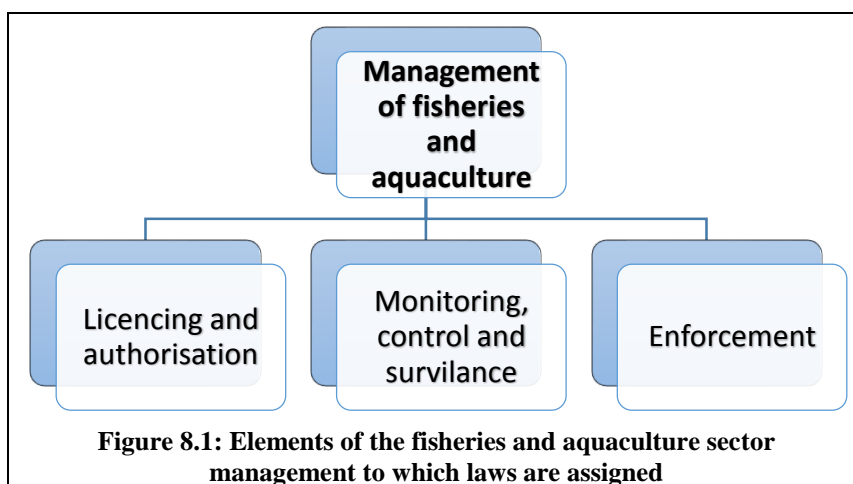
8.1 Scope of primary law and inter-linkages with other legislation

Primary laws related to fisheries and aquaculture are:

- **The Law of Ukraine "On Ukraine's Accession to the Convention on International Trade in Endangered Species of Wild Fauna and Flora" (1999)** – This law makes this international agreement mandatory

for Ukraine. The Convention sets legal grounds for international cooperation between the States Parties in the field of trade in endangered species of wild flora and fauna.

- **The Law of Ukraine "On Fauna" (2002)** – This regulates relations in the field of protection, use and reproduction of wild, domesticated or semi-domesticated fauna inhabiting land, waters, ground and air, either temporary or permanently and also inhabiting mainland and exclusive (sea) economic zone of Ukraine or belonging to natural resources of its continental shelf. The law defines state bodies which manage and regulate protection, use, reproduction and renewal of fauna.
- **The Law of Ukraine "On Fish, Other Living Aquatic Resources and Food Products Thereof" (2003)** – The law defines basic legal and organizational principles of provision of quality and safety of fish, other living aquatic resources, produced thereof food products for life and health of population and prevention of negative influence on environment in the event of fishing, processing, packaging and transportation over the customs border of Ukraine.
- **Law of Ukraine "On Fishery, Industrial Fishing and Protection of Aquatic Bioresources" (2011)** – This main law, which determines principles of activity and state regulation in the sphere of fishery, preservation and rational use of aquatic bioresources, the procedure for interaction between bodies of state power, bodies of local governments and business entities carrying out commercial fishing activities in the interior water basins of Ukraine, marine waters, the territorial sea, the continental shelf, the exclusive (sea) economic zone of Ukraine, and the high seas.
- **Law of Ukraine "On Aquaculture" (2013)** – The law determines the principles of state policy, the bases for development and functioning of aquaculture, and the legal foundations for the work of executive authorities and bodies of local governments in the sphere of aquaculture. The Law applies to legal relations in the sphere of aquaculture taking place in inland water bodies (parts thereof), technological water bodies for fishery, marine waters, territorial sea and exclusive (maritime) economic zones of Ukraine, and on the areas of land of Ukraine used for the purposes of aquaculture. Work in the sphere of aquaculture is not classified as specialized use of aquatic biological resources.



²⁴ Ukrainian laws at: http://cis-legislation.com/promo_page.fwx?countryid=12&page=2

Legislation that indirectly regulates relations in fishery and aquaculture includes:

- **The Water Code of Ukraine (1995)** – This defines the authorities of bodies of state power and local governments in the field of management and control over the use and protection of waters and reproduction of aquatic resources. The task of water legislation is the regulation of legal relations with the purpose of ensuring preservation, scientifically grounded, efficient use of waters for the needs of population and the different branches of economy (agriculture and industry).
- **The Land Code of Ukraine (2002)** – This regulates public relations regarding ownership, use and disposal of land and regulates procedure of land plot leasing, including lands covered with water.
- **The Law of Ukraine "On Exclusive (Maritime) Economic Zone of Ukraine" (1995)** – The law determines legal regime of exclusive (maritime) economic zone of Ukraine. Sea districts outwardly adjoining territorial sea of Ukraine, including neighboring areas around islands, which belong to it. Width of the exclusive (maritime) economic zone is up to 200 sea-miles counted from the same initial lines, the territorial sea of Ukraine is counted from.
- **The Merchant Shipping Code of Ukraine (1995)** – This regulates relations which arise as regards to merchant shipping. Pursuant to the code, merchant shipping is the activity related to the use of sea vessels for transportation of cargos, passengers, baggage and mail, fishing and other sea trades, exploring and mining of minerals, conducting tow, ice-breaking and rescue operations, laying cable also for other economic, scientific and cultural purposes. Merchant shipping activity may be carried out by the subjects of entrepreneurial activity, which own, use or dispose of ships, if they have special permit (license) thereto issued according to the current legislation of Ukraine.
- **Law of Ukraine "On Quality and Safety of Food Products and Food Raw Materials" (1998)** – This law determines the legal grounds for ensuring quality and safety of food products and food raw materials for health of the population of Ukraine.

8.2 Institutional arrangements related laws and regulations

8.2.1 Management and development of fisheries

According to Article 6 of the Law "On Fishery, Industrial Fishing and Protection of Aquatic Bioresources" state management and regulation in the sphere of fishery are carried out by the Cabinet of Ministers of Ukraine, the central body of executive power in the issues of agrarian policy and food. This is also the central body of executive power in the sphere of fishery through the State Agency of Fisheries of Ukraine (SAF).

The Act of Cabinet of Ministers of Ukraine from 25.11.2015 №992 regulates all procedure of commercial fisheries such as:

- 1) Distribution of quotas
- 2) Logbooks
- 3) Control
- 4) Getting permit from territorial bodies
- 5) Restrictions

Box 8.1: List of the main types of waters considered as fishery water bodies by law of Ukraine

- Black Sea estuaries, bays and channels;
- Sea of Azov estuaries, bays, including Sivash;
- Basin, Dnieper limans, reservoirs;
- Basin, Dniester limans, reservoirs;
- Basin, Seversky Donets with reservoirs;
- Basin, Southern Bug with reservoirs and limans;
- Basin, Western Bug with reservoirs;
- River Basin, Danube;
- Cooling water and technical reservoirs;
- Lakes

Source: The Act of the Cabinet of Ministers of Ukraine from 22.05.1996 № 552

On the basis of scientific research The State Agency of Fisheries of Ukraine prepares and the Ministry of agrarian policy and food of Ukraine estimates Fisheries regimes, which clarify rules on a particular water body each year.

Limits of extraction of aquatic bioresources are allocate by The State Agency of Fisheries of Ukraine and are estimate by the Ministry of Agrarian Policy and Food of Ukraine.

Afore-cited acts approving common principles and procedures for commercial fisheries as follows:

- Commercial sea fisheries in the Sea of Azov is regulated by “Fishing rules for the Sea of Azov”.
- Commercial sea fisheries in the Black Sea is regulated by “Fishing rules for the Black Sea”.
- Commercial fisheries in inland waters is regulated by “Fishing rules for inland fisheries”.

In case of commercial sea fisheries in the Sea of Azov and the Black Sea regulations of merchant shipping are also applicable (see Box 8.3).

Box 8.2: Fishing rules

Normative acts, which are in defined area of action set conditions, ways of extraction, size requirements for extracted aquatic bioresources, fish conservation, and may determine the number, types, sizes, specifications of fishing boats and fishing nets.

Box 8.3: Registration of marine ships in Ukraine

Ukrainian ships which are technically inspected by classification societies²⁵ shall be registered in the State Vessel Register of Ukraine. Ukrainian ships that shall not be registered in the State Vessel Register of Ukraine shall be registered in the Vessel Book of Ukraine. The ship may be registered only in one sea port of Ukraine. Registration of ship in the State Vessel Register of Ukraine shall be confirmed by the certificate on the right to fly the state flag of Ukraine (vessel patent), and registration in the Vessel Book of Ukraine - by the vessel card. The right to fly the state flag of Ukraine shall have a state-owned ship or the one which is owned by natural person - the citizen of Ukraine, or legal entity in Ukraine founded exclusively by the Ukrainian owners, or the ship which is owned by these persons under bareboat-charter agreement.

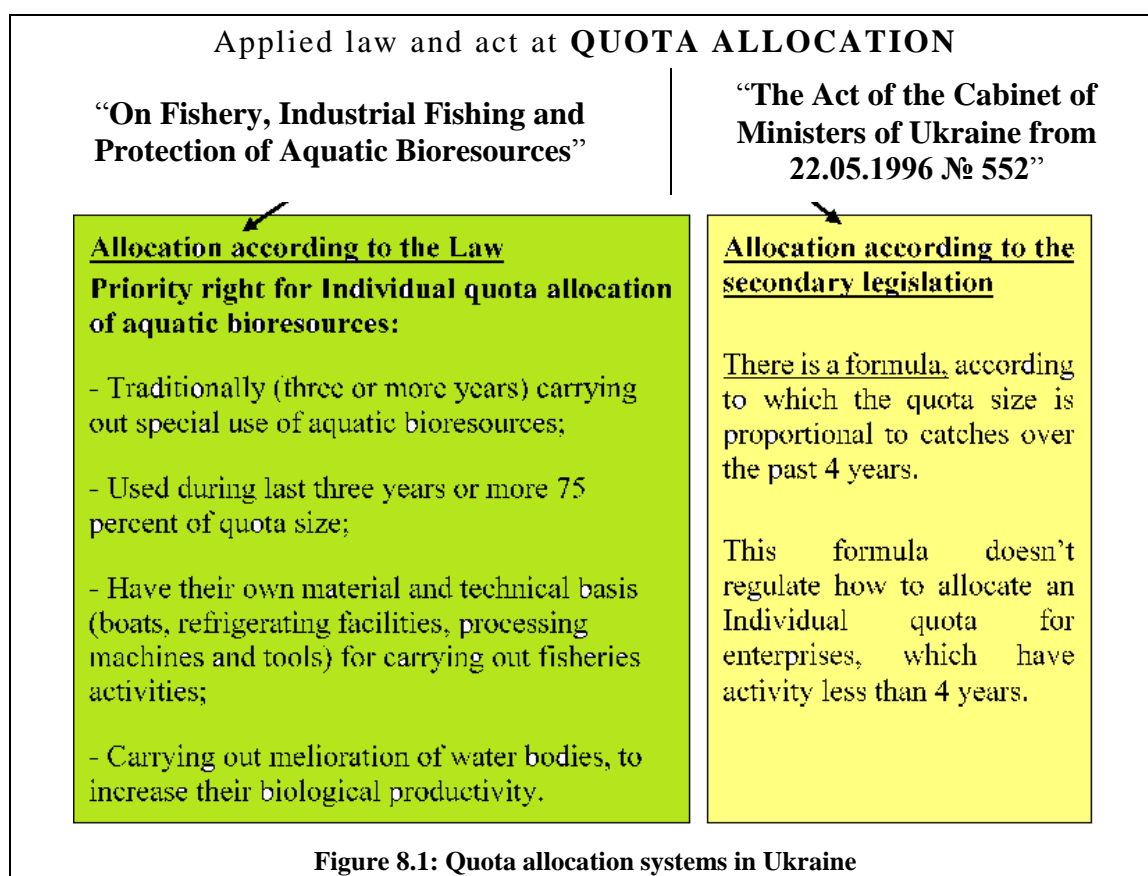


Figure 8.1: Quota allocation systems in Ukraine

²⁵ A classification society is a non-governmental organization that establishes and maintains technical standards for the construction and operation of ships and offshore structures. The society will also validate that construction is according to established standards and carry out regular surveys in service to ensure compliance with the standards.

Commercial fisheries in large water bodies can be carried out only with the permit for special utilization of aquatic bioresources and for Individual Fixed Quota. One, who wants to get fishing rights, has to file an application to the State Agency of Fisheries of Ukraine. In the application needs to be stated information about the ownership (tenancy) of landing, fishing gears and vessels.

Commercial fisheries under STRH regime is another type of special use of aquatic bioresources. STRH, as usual, is used for medium size water bodies, which is impossible to use under rental, but is not large enough to allocate quotas for more than one user. This kind of special use is carried out by the “Permit for special utilization of aquatic bioresources according to special commodity fish farming regime”, which is based upon scientific research as discussed in Chapter 2.3.2.

Amateur and sport fishing is determined by Article 27 of the Law "On Fauna" set forth that "By general use of fish fauna in cases provided by the law; free amateur and sport fishing for personal consumption allowed so can be practiced with conditions defined by the law in accordance with amateur and sport fishing rules". According to the resolution of the Cabinet of Ministers of Ukraine approved the procedure for amateur and sport fishing. Under this procedure all citizens of Ukraine, foreign citizens and stateless persons are permitted practicing amateur and sport fishing in fishery waters of Ukraine (except waters that are within territories and objects of natural reserve, fish farms and water bodies, which have restrictions on their specific use (drinking, technical, etc.), as well as reservoirs or areas where fishing is forbidden.

The state has no option to manage all aquatic bioresources hence has there is no data at all on catches of recreational fisheries.

Table 8.1: Overview of the management of fisheries

Licensing and authorization	Monitoring, control and surveillance (institution)	Enforcement (institution)
Permit for special utilization of aquatic bioresources issues by both: <ol style="list-style-type: none"> 1. The State Agency of Fisheries of Ukraine 2. Concerned territorial bodies of The State Agency of Fisheries of Ukraine. 	<ol style="list-style-type: none"> 1. The State Agency of Fisheries of Ukraine and territorial bodies of The State Agency of Fisheries of Ukraine. 2. Territorial bodies of The State Ecological Inspection of Ukraine. 3. Territorial bodies of The State Border guard service of Ukraine. 1. System of monitoring control of vessels only Marine and Ocean Fisheries. 	<ol style="list-style-type: none"> 1. The State Agency of Fisheries of Ukraine and territorial bodies of The State Agency of Fisheries of Ukraine. 2. Territorial bodies of The State Ecological Inspection of Ukraine. 3. Territorial bodies of The State Border guard service of Ukraine.

8.2.2 Management and development of aquaculture

According to the law “On Aquaculture” aquaculture is also an agricultural activity aiming at breeding, keeping and growing aquatic organisms under completely or partially controlled conditions, to produce and sell agricultural products (aquaculture product), produce food, restore biological resources, conduct selective breeding work, introduction, relocation, acclimatization and re-acclimatization of aquatic organisms, replenishing stocks of aquatic biological resources, preserving their biodiversity, and providing recreational services.

In terms of organization and technological parameters, aquaculture can be intensive, semi-intensive and extensive. The main directions of commercial aquaculture can be pasture (CBF), pond and industrial aquaculture (in tanks and cages).

The use of a fishery water body for the purpose of aquaculture is granted to a legal entity or a natural person on the conditions of rent, according to the “Water Code of Ukraine”. The use of parts of a fishery water body is granted to a legal entity or a natural person on the conditions of rent by the authorities that manage water-covered land (water areas) according to the “Land Code of Ukraine”.

Entities engaged in aquaculture must submit reports about the total output to territorial bodies of the State Agency of Fisheries of Ukraine annually however there are no consequences if these reports are not submitted.

Table 8.2: Overview of the management of aquaculture

Licensing and authorization	Monitoring, control and surveillance (institution)	Enforcement (institution)
1. Authorization only by the rent of water body. 2. Permit of special water usage	1. Owner (local authority) controls compliance lease agreement terms. 2. Territorial bodies of The State Agency of Water Resources.	1. Owner (local authority) 2. Territorial bodies of The State Agency of Water Resources.

8.3 Fish quality and consumers safety regulations

Fish quality and consumers safety are regulated by The Law of Ukraine “On Quality and Safety of Food Products and Food Raw Materials” and The Law of Ukraine "On Fish, Other Living Aquatic Resources and Food Products Thereof".

The Law of Ukraine "On Fish, Other Living Aquatic Resources and Food Products Thereof" defines basic legal and organizational principles of provision for quality and safety of fish, other living aquatic resources, produced thereof food products for life and health of population and prevention of negative influence on environment in the event of fishing, processing, packaging and transportation over the customs border of Ukraine. The State Service of Ukraine on Food Safety and Consumer Protection is a central body of executive authority with main tasks which include:

- State control in compliance with consumer protection legislation.
- State control in compliance with advertising legislation as regards protecting consumers while advertising.
- State veterinary-sanitary control.
- Conduction of state expert sanitary epidemiological assessment, provision of relevant conclusions based on its results, etc.

Quality and safety of fish and other aquatic bioresources grown in ponds and other water bodies, shall be confirmed by the veterinary certificate, issued by the territorial bodies of the State Service of Ukraine on Food Safety and Consumer Protection once a year for the whole lot of grown live fish or other living aquatic resources.

Special use of fish and other aquatic bioresources shall be conducted by the subjects of economic activity mainly for payment within the set limits at presence of licenses and positive veterinary sanitary evaluations of condition of commercial plots of fish industry water bodies of national significance and safety directories of fish and other living aquatic resources.

Fishery products may be processed by economic entities upon permit to this type of activity issued by the bodies of state sanitary epidemiological service and state service of veterinary medicine. Production of economic entities, which process fishery products, shall be attested for conformity to the obligatory requirements set by normative legal acts and normative documents.

Table 8.3: Overview of the management of fish processing

Licensing and authorization	Monitoring, control and surveillance (institution)	Enforcement (institution)
Attesting of processing facilities	Territorial bodies of: 1. State Service of Ukraine on Food Safety 2. Consumer Protection	Territorial bodies of: 1. State Service of Ukraine on Food Safety 2. Consumer Protection

8.4 International relationships of Ukraine on fisheries and aquaculture

Ukraine maintain an extensive international relationship with both neighboring and distant countries and their cooperating bodies. Cooperation with the European Union, which represents twenty eight countries²⁶ is bound with an association agreement (see Box 8.4).

Box 8.4: Association agreement between the EU and Ukraine

Ukraine is a priority partner country within the [European Neighborhood Policy](#) (ENP) and the [Eastern Partnership](#). The current legal framework for EU-Ukraine relations is provided by [the Association Agreement](#), which replaced [Partnership and Co-operation Agreement \(PCA\)](#) in 2014.

It is a pioneering document, the first agreement based on political association between the EU and the Eastern Partnership country; Ukraine.

The Agreement focuses on support to core reforms, economic recovery and growth, and governance and sector cooperation in areas such as energy, transport and environment protection, industrial cooperation, social development and protection, equal rights, consumer protection, education, youth, and cultural cooperation, as well as on good governance, market economy and sustainable development.

It includes a Deep and Comprehensive Free Trade Area (DCFTA), which goes further than classic free trade areas, as it will both open up markets but also address competitiveness issues and the steps needed to meet EU standards and trade on EU markets.

The Agreement will also highlight Justice, Freedom & Security issues which also include provisions on mobility.

(Source: http://eeas.europa.eu/delegations/ukraine/eu_ukraine/political_relations/index_en.htm)

Regarding international activities of Ukraine within the regional fishery organisations it has to be taken into account that Ukrainian fishing industry has multiannual history and traditions, being active in different areas of the World Ocean, Ukraine is member-country of some international regional fishery organisations and some international nature protection organisations, which are focusing, in particular, on fishery aspects:

- Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)
- General Fisheries Commission on Mediterranean (GFCM)

²⁶ https://europa.eu/european-union/about-eu/countries_en

- Northwest Atlantic Fisheries Organization (NAFO)
- Ukrainian-Russian Commission on Fisheries in the Sea of Azov

Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR)

Ukraine has been an independent member country of this international organization since 1994, as the assignee of the Soviet Union.

Every year Ukrainian delegations of experts and official representatives take part in the activities of CCAMLR, as regular session of the Commission, together with regular meeting of Committees (Scientific Committee, Standing Committee on Implementation and Compliance, Standing Committee on Administration and Finance), in meetings of the Working Groups (Working Group on Statistics, Assessment and Modelling, Working Group on Ecosystem Monitoring and Management, Working Group on Fish Stock Assessment).

Within CCAMLR-activities Ukraine is taking part in management processes for conservation of Antarctic marine ecosystems and living resources.

The statistical and biological data are collected by Ukraine in CCAMLR on board of Ukrainian fishing vessels (conducting toothfish fishing and krill fishing) and on the Ukrainian Antarctic station "Vernadsky Research Base".

Ukrainian specialists are working, as International Scientific Observers, on board of fishing vessel of some other member-countries of CCAMLR (Spain, Republic of Korea, Russian Federation).

The leading national authority responsible for CCAMLR-activities is the State Agency of Fisheries of Ukraine, which is acting in coordination with the Ministry of Ecology and Natural Resources of Ukraine, the National Antarctic Scientific Center of the Ministry of Education and Science of Ukraine, the Ministry of Foreign Affairs of Ukraine.

General Fisheries Commission on Mediterranean (GFCM)

Ukraine is the active participant of GFCM activities in the region of the Black Sea since 2014.

In 2015 Ukraine (together with Georgia), by decision of the 39th session of GFCM, joined the Commission as the Cooperating non-Contracting Party, and there is a plan of step-by-step implementation of fisheries and aquaculture management tools proposed by GFCM.

Representatives of the State Agency of Fisheries of Ukraine and Ukrainian fisheries institution takes part regularly in activities of GFCM devoted to the long-term strategy of sustainable development of Black Sea fishery and to fish stocks protection and management.

GFCM provided special conservation measures to protect and do restocking of Black Sea turbot, picked dogfish and other valuable fish species of the Black Sea.

Nowadays Ukraine together with other Black Sea countries works for realization of joint monitoring research program for fish stock assessment on the all sea area, including economical zones of the all riparian Black Sea countries.

Northwest Atlantic Fisheries Organization (NAFO)

Ukraine has joined to the Organization in 1999 (by the Law 831-14, 06.07.1999). The country is member of the Convention. However, Ukraine did not fish in the NAFO-area, only monitored the situation in the Convention zone. So, participation in NAFO-processes means for Ukraine only strategic work for perspectives to development of the national fishing fleet.

Ukrainian-Russian Commission on Fisheries in the Sea of Azov

The Commission was founded in 1993, on the ground of Ukrainian-Russian Agreement on Fisheries (24.09.1992) and Ukrainian-Russian Agreement on the Sea of Azov (14.09.1993).

The Commission organized its regular session twice a year in the first years of activity, and later the regular sessions had place annually.

The last (27th) session was held in Sochi (Russian Federation) in 2015, October.

Main tasks of the Commission are:

- To consider status of aquatic living resources of the Sea of Azov on base of scientific data presented by national fishery institutions;
- To establish catch limits for the next year on the exploited fish species and distribute it between the countries;
- To develop fishing rules for the Sea of Azov (actual for both countries) and advise additional conservation measures for the next year;
- To coordinate international procedures in case of control of fishing vessels of the one Party by inspector vessels of the other Party;
- To consider status of Acipenseridae populations in the basin of the Sea of Azov and provide decisions within CITES- recommendations.

8.5 Conclusions and recommendations

There are some specific threats which may seriously endanger the fishery subsector:

- The development of commercial fishing access rights in Ukrainian statute law has been an incremental process, linked to the evolution of public policy and legislation for the management of commercial fisheries. Unfortunately, according to the current legislation Individual Fixed Quota are not transferable, that does not entitle commercial fishermen to dispose theirs rights to third persons.
- Lack of a country-wide strategy on inland fisheries without which it seems the subsector is excluded from prioritized national and international support programs.

Qualitative and quantitative damage to fish fauna can also be a threat due to:

- Different conduct and judgement of sport and commercial/economic fishing. Only commercial fishers are obliged to stock, while amateur and sport fisheries operate free of charge.
- Lack of monitoring of recreational fisheries.
- Missing systematic and regular restocking of waters. Though proper restocking of fish in natural waters is obligatory by law, both important details and enforcement, as well as supervision of restocking are missing.
- Blocked migration of fish caused by dams and hydroelectric power stations together with the lack of restocking.
- Legal and illegal excavation of stone and sand in rivers destroys habitats and spawning grounds.
- The lack of a country wide strategy for aquaculture.
- Administration of the subsector is complicated, moreover implementation and enforcement laws are also incomplete.

Recommendations:

- Improvement of the legislation which regulates commercial fisheries (stimulating the development of production, processing and re-equipment).
- Implement legal mechanism to allow transfer of Individual Fixed Quota.

- State should manage all water aquatic resources and have all data on catches including recreational fisheries.
- Harmonizing normative acts that regulate STRH in accordance with other legislation in order to motivate long-term investments by this regimes.
- Actualization of fishing rules by making them clear and simple to understand.
- To establish simple process for the rent of water bodies.
- To unify all normative acts on safety and veterinary control of fish and fish products.

International cooperation for protection of water ecosystems and aquatic living resources should include:

- Continued participation of Ukraine in activities of the regional fisheries and nature protection organisations.
- Supporting membership of Ukraine in the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR);
- Receiving of the status of the Contracting Party in the General Fisheries Commission for the Mediterranean (GFCM);
- Advancing bilateral international communications on issues of development of fisheries and international cooperation.

9. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Geographical and hydrological conditions of the country are favorable and there is a great potential for developing a sustainable fishery and aquaculture both in inland and marine waters. Preconditions of this development include the present clear and fact-finding review of the sector and the cooperation of all concerned national and international stakeholders to conclude and selected those priorities which would yield envisaged progress.

9.1 Inland Fisheries and aquaculture

Inland fisheries

At present from the 2 422 000 ha inland waters only about 37% (897 500 ha) is known to be utilized by commercial fisheries. All these shallow and large water bodies could and should be utilized with culture based fishery (CBF) of high value fish with very low prime costs. In addition, there are inland waters (mainly smaller rivers and all large irrigation canals) which are not exploited by fisheries at all. There are two types of fishery management of inland waters; CBF in large reservoirs and STRHs.

Important characteristics of fisheries exploitation of large inland waters (mainly Dnieper water reservoirs) are that license is given to several fishing companies on the same water body. These companies are not restricted to operate in a certain area or section of the licensed water body, but can fish freely anywhere within the boundaries until allocated quotas are captured. Total yearly quotas, i.e. yearly allowed total catches for each water bodies, are estimated and established by scientific institutes. From these quotas the range of allowed fish species and their amounts are distributed among fishers/fishing companies.

STRH fishery management regime usually applies for natural lakes and for medium size water reservoirs. A licenses is provided free of charge to one single enterprise for each water body. Prior to issuing a state permission interested companies must have a “Scientific Justification” from a scientific or research institute together with a statement of approval issued by concerned state environmental authorities (i.e. the local department of the Ministry of Ecology and Natural Resources of Ukraine). In 2014 there were 754 STRH companies which managed a total area of 160 730.8 ha.

It is a basic civil right to angle in inland waters of Ukraine, thus inland recreational (amateur or sport) fishing is open in public waters. Daily catch quotas and the maximum number of hooks per angler is fixed but no control and supervision on observation relevant rules and regulation exist in practice. In addition there is no statistical monitoring of the subsector therefore no information the range and quantity of species captured by the public.

Management of fish stocks in inland fishery waters is rather contradictory. Though inland waters of Ukraine are fertile and ideal for a highly professional, science based CBF management, there is less focus on restocking or it is even neglected both by companies and authorities, while fishing is mainly illegal (IUU fishing).

Freshwater aquaculture

Basically two different types of fish farms should be mentioned: specialized and non-specialized pond fish farms. These types of fish farming are practiced in ponds and small multipurpose water reservoirs built all over in the moderately hilly regions of the country. Their total number is around 50 000 and their water surface is above 537 000 ha. , respectively.

The characteristic of non-specialized fish farms is that individual farmers or companies lease and use one single small water reservoir. The registered total area utilized on this way is about 70 000 ha. At present these ponds are rented mainly by individual farmers or private entrepreneurs.

There are 41 specialized fish farms in Ukraine. Their total area is 53 125 ha. In the past they were the main freshwater fish producer farms in the country. Since the early 1990's most of these farms have been reorganized to private joint stock companies but there are still several state farms which are not privatized yet. They are almost equally distributed around the country. Some of them are very large, located in one block. Others consist of several semi-independent divisions, randomly scattered in a region.

At present there are only a few intensive fish farms of trout and sturgeon in the country. Their number and production is not exactly known. Though there are regions where intensive trout and sturgeon culture and cage culture of selected species - including common carp and catfish - might also be feasible the industry does not develop due to the lack of widely available good quality fish feed essential for intensive fish culture.

Conclusions on and recommendations to inland fisheries and aquaculture

Due to a range of various reasons there are considerable differences between declared, actual and potential performance of inland fisheries and aquaculture. In order to reduce the gap between such data some administrative and technical measures are required:

- Development of a simple and easily understandable legislation of inland fisheries and aquaculture.
- Enforcement of rules and regulations through the entire administrative procedures of coordination, control and management of the subsector.
- Reduction of IUU fishing by public awareness raising and increasing the control of concerned social organizations and departments of police forces.
- Updating the list of different inland waters which would allow their grouping based on their physical, chemical and biological qualities.
- Surveying and analyzing fish production in different types of inland water bodies.
- Defining sustainable fish production figures in each types of inland water bodies.
- Defining the required quantity and quality of fish seed as per different types of inland waters.
- Outlining required measures for improving fish seed production capacities.

9.2 Marine fisheries and aquaculture

Marine fisheries can be divided into two independent divisions; fisheries in the Black Sea and Azov Sea within the EEZ (Exclusive Economic Zone) of Ukraine and neighboring countries and distant-water fisheries on high seas.

Marine fisheries of Ukraine in the Black Sea and the Sea of Azov resulted in a total landing of 32 649 tons of fish and 1 668 tons of invertebrates in 2015. This does not include catches on high seas (9 076 tons).

Fishing in the Sea of Azov is conducted on an international base of joint decisions within the Ukrainian-Russian Commission on Fisheries in the Sea of Azov, acting according to the bilateral agreements of Ukraine and the Russian Federation (1992-1993). Every year the Commission has its regular sessions where catch limits and their distribution between Ukraine and Russia is established by joint protocols. Catches on the Sea of Azov was nearly above 29 850 tons in 2015.

In Ukraine the main type of fishing activities in the Black Sea is sprat trawling. Fishing in the Black Sea is managed on the basis of scientific assessments. Between 2008 and 2013 the average fish landing in the Black Sea was about 38 200 tons but this dropped to 3 000 tons in 2014. The capacity of the Ukrainian fishing fleet has not changed since independence. There are no new fishing vessels.

There are different factors influencing the efficiency of fish stock management in marine waters. In particular IUU fishing should be mentioned as a primary source of problems. Stock management of sturgeons in the Sea of Azov and the Black Sea, the decrease of other species such as Azov turbot and small pelagic fishes (Azov anchovy, Black Sea tulka) and the acclimatization of haarder in the Sea of Azov together with an unfavorable transformation of fish stocks and mass fish mortality in the Sea of Azov needs professional attention.

Marine aquaculture

There is no significant marine aquaculture in Ukraine, mainly due to a lack of suitable sites. Perhaps mussel cultures should be mentioned where production remained below 100 tons in the last years.

Conclusions on and recommendations to marine fisheries and aquaculture

Reforms to develop the marine fishery sector of Ukraine should go through the state system, which critically lacks public funding. Consequently, each activity needs to be based on already available financial resources (both planning and implementation of the reform program) until the entire system becomes sustainable. A reform program would be especially important because the fishery sector of Ukraine has a great potential to develop. The simple fact that at present the demand for fish and fishery products is satisfied mainly from imports proves this statement. Optimization of conditions for the development of marine fisheries should include administrative and technical measures:

- A separate management of the fishery and aquaculture subsectors.
- Reduction of the critical deficit of public funding in the sector.
- Simplification of technical procedures for a proper conduction and development of fishery enterprises in Ukraine.
- Providing assistance for fishery enterprises in financial (proper credits) and technical issues.
- Combating IUU-fishing with considering the main principles of FAO Code of Conduct for Responsible Fisheries.
- Training and involving high quality professional experts and staff in the reform process.
- Preparing science based estimations for the establishment of catch limits for all species sensitive to anthropogenic impacts and changing natural conditions.
- Revising the protection status of vulnerable fish species and ecosystems on a regular basis to increase effectiveness of relevant measures.
- Provide public funding for state hatcheries to maintain genetic stock collections and regularly restock fish species of high value (sturgeons, sander, haarder, turbot etc.) in marine waters.
- Disseminating information and developing awareness raising campaigns in schools and mass media (TV, press) on principles of conservation of living aquatic resources and water ecosystems.

9.3 Fish consumption and trading with fish and fishery products including import and export

Both wholesale and retail markets of fish are fluctuating in Ukraine. Though the level of fish consumption has not reached the level of 1990 yet, still there is an increase (above 10 kg/capita) when compared to the period of 1992-1995 (see Figure 3).

Currently, there is no mechanism for a proper distribution of fish and fish products on the domestic markets of Ukraine. At present the functioning of fish markets is based on governmental funding.

Today consumers have access to fish and fish products mostly through wholesalers. This has a negative effect on the quality of fish and fish products due to a lack of appropriate storage conditions.

The level of dependence of the food market from imported fish and fish products is rapidly increasing. Fish supply to the domestic market from Ukrainian catches and production is 20 % while the import is 80 %. Consequently, the domestic market of fish and fish products largely depends on imports.

Ukraine has introduced a 10% import duty in February, 2015, thus fish and fish products were included in the list of additional taxable goods. The introduction of this additional fee has not justified itself, since budget revenues have declined and the Ukrainian fish market has suffered the most. Though traders started to import cheaper fish products, still imports reduced by 40% in 2015.

Present import situation of fish and fish products is explained by the lack of specialized national fishing fleet and processing industry, as well as by improperly defined quotas in international waters and increased IUU fishing in general, poaching in particular.

It is time to change the market structure (replacing import with national production) and satisfy market demands by fresh, affordable Ukrainian fish products.

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 of 17.7 million USD. This is much less than it was in 2014 (42 800 tons) and 2013 (51 400 tons).

Ukraine has adequate conditions to grow European plaice, rainbow trout, coregonids, channel catfish, perch, starry sturgeon and American paddlefish. Not only traditional species of fish, but also some of the currently imported ones could be produced in the country, like gilthead sea bream, sea bass and tilapia.

Improving fish trading of Ukraine specific programs should be implemented:

- To reduce the import of fish products and replace them with national ones.
- To establish producers/traders associations.
- To support fish processing and development of fish distribution chains and market conditions.

9.4 Education and research in fishery and aquaculture

Due to the limited number of work opportunities and relatively low salaries teaching and research positions are not attractive in the sector. In recent years fishery research is applied only in stock estimations of living aquatic resources in commercial fishing waters. There are other problems which further reduce the popularity of working in the teaching and research of the sector:

- Outdated facilities and equipment in educational and research institutions.
- A gap between education and practice.
- Poor knowledge of English language, biostatistics and mathematical methods.
- Lack of technical textbooks and access to international scientific literature.
- Chronic lack of financial resources manifested in acute shortage of money for salaries and postgraduate scholarships and for organizing and participating in training or extension courses.

9.5 Institutional frameworks of fisheries and aquaculture

Social and civil societies

Social and civil societies representing fishers and fish producers are practically missing or working with very low efficiency. Except a few associations of commercial marine fishers and fishery

enterprises, there are no such organizations for inland waters and anglers, as well as fish farmers also lack representation.

State Agency of Fisheries of Ukraine

Key roles of the Ministry of Agrarian Policy and Food of Ukraine (MAPF) in fishery and aquaculture are to establish and develop sector related strategies and policies. From the five subordinate authorities of MAPF the State Agency of Fisheries of Ukraine (SAF) is responsible (1) to enforce state strategy in fisheries and aquaculture, (2) to control and ensure a proper sustainable use of living aquatic resources, (3) to organize scientific monitoring of the appropriate conservation of aquatic bio-resources, (4) to provide recommendations for a sustainable development of the fishery and aquaculture industry in cooperation with fishery and aquaculture associations and (5) to organize the participation of Ukraine in international activities of fishery and aquaculture and ensure cooperation with global and regional organizations of fishery, aquaculture and nature protection. SAF has regional subdivisions in all twenty four provinces (oblasts) which are structural parts of the Organization. In addition, SAF has two special marine sub-divisions; one for the Sea of Azov and one for the Black Sea. Under SAF management there are state fish-restocking hatcheries and scientific institutes.

Statistical services

Statistics and information services play a very important role in sector administration and management. They provide reliable data and information to all stakeholders. Besides, statistics has an important role in the assessment of field potentials, risks and economic returns and preparation of elaboration plans for field support. Main data sources are (1) The State Statistics Service of Ukraine (<http://ukrstat.gov.ua/>) and (2) The State Agency of Fisheries of Ukraine (<http://darg.gov.ua/>). There are three forms to collect statistics on inland and marine fisheries and on aquaculture. Though data submission to the State Statistics Service of Ukraine is mandatory aquaculture there are no consequences if required statistical data on aquaculture is not submitted by a producer. In order to receive reliable information a new legislation is required for statistical data collection in fisheries, aquaculture and their support industries including fish processing and marketing. In addition, the below listed issues should also be considered for the improvement of the sector:

- No statistical data are collected on recreational fishing.
- There is an imperfect system of collection and submission of fisheries reports.
- No statistical information on marine aquaculture is available.
- No statistical information on marketed aquaculture products is available.
- The quality of reported indicators of fish production and fish products is low.
- Statistical information on employment related issues of the sector is missing.
- Statistical reporting process and report contents also need improvement.

At present no government programs exist to provide financial support for companies and individual fishery and aquaculture experts. Loans from commercial banks are available with common terms, when proper guarantees (i.e. collaterals) are requested by banks.

9.6 Legal framework of fisheries and aquaculture

Legal framework governing fisheries and aquaculture in Ukraine, includes (1) ownerships over water and fisheries resources and rights and conditions of their exploitations, (2) definition of responsibilities between national, state and territorial bodies and (3) sector management laws.

In this framework there are applicable provisions that support both strengths and weaknesses. Out of these an observable weakness inherent in the fisheries management legislation is that it does not approach the establishment of rights as property in a spatial sense, but rather as privileged activity.

Overview of recommended actions

Though there are huge potentials to develop fisheries and aquaculture in Ukraine, there are also certain obstacles which hinder a proper, sustainable exploitation of the resources.

At present there is no clear and reliable knowledge on the total area of inland surface waters and their current and potential yearly production. In addition, fisheries management of waters lacks restocking and supervision of agreed quotas and approved management and fishing plans.

To overcome listed problems the followings are recommended:

- Updating the list of inland surface waters including the characterization of their typical (physical, chemical and biological) qualities important for fisheries and aquaculture.
- Determining sustainable fish production potentials of different inland waters as per their categories and types.
- Improving data collection on inland fishery and aquaculture.
- Involving science in estimation and improve determination of catch limits for all species sensitive for anthropogenic impact and changing natural conditions.
- Revising the protection status of vulnerable fish species and ecosystems on a regular basis to increase effectiveness of relevant measures.
- Providing public funding for state restocking hatcheries to support the collection of genetic resources and regular restocking of valuable fish species (sturgeons, sander, haarder, turbot etc.) in marine waters.
- Improving data collection on marine fishery and aquaculture.
- Improving transparency and monitoring of amateur fishing both in inland and marine waters.
- Improving transparency and develop a coherent system for the utilization of public waters, including licenses, when duties and benefits are clear and are properly set and observed.
- Implementing an overall reform in sector related statistical services for a proper monitoring of commercial and recreational fishing as well as aquaculture.
- Improving law enforcement and increase public awareness.
- Developing a more attractive and sustainable system of working conditions, including remunerations and incentives for officers, teachers and researchers working in the sector.
- Preparing a transparent and easy to follow legal framework for both commercial and amateur fisheries and aquaculture.

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TABLES OF SOURCE DATA

Contents

Water and fisheries resources

- Table A1-1: List of largest rivers of Ukraine
- Table A1-2: List of largest natural freshwater lakes of Ukraine
- Table A1-3: List of largest lagoons of Ukraine
- Table A1-4: Geographical distribution of ponds and small water reservoirs of Ukraine
- Table A1-5: List of large water reservoirs of Ukraine
- Table A1-6: List of large water canals of Ukraine
- Table A1-7: List of pond fish farms in Ukraine
- Table A1-8: List of freshwater commercial and game fishes in Ukraine
- Table A1-9: List of marine commercial and game fishes in Ukraine

Inland and marine fisheries

- Table A1-10: Dynamics of fish catches between 1990 and 2015
- Table A1-11: Restocking of inland water bodies and Azov-Black Sea basins by state fish reproduction centers in #####

Inland fisheries and aquaculture

- Table A1-12: Landing of main commercial fish species from Dnieper reservoirs in 2015
- Table A1-13: Landings of main commercial fish species from inland waters other than Dnieper reservoirs in 2015
- Table A1-14: Estimated stocks and established limits of the most important fish species in Dnieper reservoirs in 2015
- Table A1-15: Approximate number of fishing companies on the different large inland waters in 2015
- Table A1-16: Approximate number of fishing gears and vessels on Dnieper reservoirs in 2015
- Table A1-17: Estimated number of required restocking material of carps and their expectable feasible production in inland waters of Ukraine
- Table A1-18: Allowable minimum size of game fishes to be taken by amateur fishers in Ukraine
- Table A1-19: Dynamics of aquaculture production by regions of Ukraine

Marine fisheries

- Table A1-20: Landing of main commercial fish species by Ukraine in the basin of the Sea of Azov in 2015
- Table A1-21: Approximate effectiveness of fishing gears for commercial catching of main fish species in the Sea of Azov in 2015
- Table A1-22: Landing of water invertebrates by Ukraine in the basin of the Sea of Azov in 2015
- Table A1-23: Fish stocks and catch limits for 2015 established for the Sea of Azov
- Table A1-24: Traditional structure of Ukrainian fishing in the Black Sea
- Table A1-25: Data of the Ukrainian fleet in the Black Sea (2015)
- Table A1-26: Landing of main commercial fish species by Ukraine in the Black Sea in 2015
- Table A1-27: Landing of water invertebrates in the basin of the Black Sea in 2015

Table A1-28: Base stock levels and established catch limits of the main fish species of the Black Sea in 2015

Table A1-29: Landing of main commercial species of aquatic living resource by Ukraine in the oceanic fishing area 34 in 2015

Table A1-30: Landing of main commercial species of aquatic living resources by Ukraine in the oceanic fishing area 41 in 2015

Table A1-31: Landing of main commercial species of aquatic living resources by Ukraine in the oceanic fishing area 81 in 2015

Table A1-32: Landing of main commercial species of aquatic living resources by Ukraine in the oceanic fishing area 48 and 88 in the fishing season 2014/2015

Table A1-33: Ukrainian Fishery Fleet in 2015

Fish consumption and price

Table A1-34: Frequency of eating fish and fish products in 2015

Table A1-35: Average price of fish and fish products in 2014-2015

Export and import

Table A1-36: Dynamics of imports of the main marketable groups of fish commodities in Ukraine between 2011 and 2015

Table A1-37: Trout import in 2015

Table A1-38: Trout exports in 2015

Table A1-39: Dynamics of export of the main marketable groups of fish commodities in Ukraine between 2011 and 2015

Table A1-40: Export of pike perch fillet

Higher education

Table A1-41: List of institutions of higher education on fisheries and aquaculture

Associations

Table A1-42: List of associations of commercial fishers and aquaculturists of Ukraine

Table A1-1: List of largest rivers of Ukraine

Name	Length			Estimated area in Ukraine (km)	Drainage area (km ²)	River basin
	Total (km)	in Ukraine				
		km	%			
Aidar	264	213	81		7 420	Siversky Donets
Boh (Buh)	806	806	100		63 700	Dnieper
Bazavluk	157	157	100		4 200	Dnieper
Chychyklyia	156	156	100		2 120	Southern Buh
Danube	2 900	174	6		817 000	Danube
Derkul	163	153	94		5 180	Siversky Donets
Desna	1 130	591	52		88 900	Dnieper
Dnieper	2 201	981	45		291 400	Dnieper-Bug Estuary
Dniester	1 362	705	52		72 100	Dniester
Hirsky Tikych	167	167	100		3 510	Hnylyi Tikych
Hnylyi Tikych	157	157	100		3 150	Synyukha

Name	Length			Estimated area in Ukraine (km)	Drainage area (km ²)	River basin
	Total (km)	in Ukraine				
		km	%			
Horyn	659	577	88		27 010	Prypiat
Ikva	156	156	100		2 250	Styr
Inhul	354	354	100		9 890	Southern Buh
Inhulets	549	549	100		14 870	Dnieper
Irpin	162	162	100		3 340	Dnieper
Kalmius	209	209	100		5 070	Kalmius
Khorol	308	308	100		3 870	Psel
Krynka	180	170	94		2634	Mius River
Luhan	198	198	100		3 740	Siversky Donets
Molochna	197	197	100		3 450	Molochna
Murafa	163	163	100		2 410	Dniester
Oril	346	346	100		9 800	Dnieper
Oskil	472	177	38		14 800	Siversky Donets
Oster	201	199	99		2 950	Desna
Prut	967	272	28		27 500	Danube
Prypiat	761	261	34		121 000	Dnieper
Psel	717	526	73		22 800	Dnieper
Ros	346	346	100		12 600	Dnieper
Salhir	204	204	100		3 750	Syvash
Samara	320	320	100		22 600	Dnieper
Seim	748	222	30		27 500	Desna
Sian	444	55	12		16 700	Visla
Seret	242	242	100		3 900	Dniester
Siversky Donets	1 053	672	64		98 900	Don
Sluch	451	451	100		13 800	Horyn
Smotrych	168	168	100		1 800	Dniester
Snov	253	190	75		8 705	Desna
Southern Buh	806	806	100		63 700	Dnieper-Bug Estuary
Stokhid	188	188	100		3 150	Prypiat
Stryi	232	232	100		3 060	Dniester
Stvyha	152	152	100		5 440	Prypiat
Styr	494	445	90		13 100	Prypiat
Sula	365	365	100		19 600	Dnieper
Teteriv	385	385	100		15 300	Dnieper
Tiasmyn	160	160	100		4 540	Dnieper
Turia	184	184	100		2 800	Prypiat
Tylihul	154	154	100		3 300	Tylihul

Name	Length			Estimated area in Ukraine (km)	Drainage area (km ²)	River basin
	Total (km)	in Ukraine				
		km	%			
Tysa	966	201	21		11 300	Danube
Ubort	292	171	59		5 820	Prypiat
Udai	327	327	100		7 030	Sula
Uzh	256	256	100		8 080	Prypiat
Velyka Vys	166	166	100		2 860	Synyukha
Velykyi Kuyalnyk	150	150	100		1 860	Velykyi Kuyalnyk
Vorskla	464	348	75		14 700	Dnieper
Vovcha	323	323	100		13 300	Samara
Vysun	201	201	100		2 670	Inhulets
Western Bug	831	401	48		73 500	Narew [Narva]
Zbruch	244	244	100		3 400	Dniester
Total	27 631	17 813	64		2 124 829	

Source: Geographic encyclopedia of Ukraine, 1993; Ukrainian Wikipedia, 2016

Table A1-2: List of largest natural freshwater lakes of Ukraine

Name	Area		Depth (m)		Nearest town	Water basin
	km ²	ha	Avg.	Max.		
Svityaz	24.2	2 420	7	58.4	Shatsk	Western Bug-Prypyat
Pulemetske	16.3	1 630	4	19.2	Shatsk	Western Bug-Prypyat
Turske	13.5	1 350	1.2	2.6	Ratnivske	Prypyat
Luky	6.8	680	2.1	3.2	Shatsk	Western Bug-Prypyat
Lyutsymyr	4.3	430	4.1	11.2	Shatsk	Western Bug-Prypyat
Total	65.1	6 510	-	-	-	-

Source: Geographic encyclopedia of Ukraine 1993

Table A1-3: List of largest lagoons of Ukraine

Name	Area		Depth (m)		Salinity (‰)	Water basin
	km ²	ha	Avg.	Max.		
Alibey	72.0	7 200	2.0	2.5		Black Sea
Berezan	60.0	6 000		3.2		Black Sea
Budaki	31.0	3 100	1.1	2.2	2-32	Black Sea
Budury	0.0	0				Black Sea
Burnas	22.6	2 260	1.9		30	Black Sea
Dnister estuary	360.0	36 000	2.5			Black Sea
Dnieper-Boh estuary	1 000.0	100 000	6.5	12.0		Black Sea
Dzhantshey	0.0	0				Black Sea
Kahul lake	93.5	9 350	2.0	7.0		Black Sea
Karachaus	7.6	760				Black Sea
Katlabukh lake	68.0	6 800	4.0			Danube

Name	Area		Depth (m)		Salinity (‰)	Water basin
	km ²	ha	Avg.	Max.		
Khadzhybei	112.0	11 200	5.0	18.3	3-6	Black Sea
Khadzhyder	8.0	800	#			Black Sea
Kuchurhan estuary	27.3	2 730	3.5	4.2		Black Sea
Kuialnyk estuary	52.0	5 200	1.0	2.6		Black Sea
Kurudiol	0.0	0				Black Sea
Kytai lake	60.0	6 000	5.0			Danube
Mahala	0.8	76				Black Sea
Malyi Sasyk	2.4	236				Black Sea
Martaza	0.5	50				Black Sea
Molochnyi liman	224.6	22 460			5-40	Sea of Azov
Sasyk estuary	210.0	21 000	1.1	2.7		Black Sea
Shahany	70.0	7 000	2.0	2.4		Black Sea
Solodkyi liman	0.3	25			4-6	Sea of Azov
Syvash	2 560.0	256 000	1.0	3.0	50	Sea of Azov
Tylihul estuary	170.0	17 000		19.0		Black Sea
Utluksky liman	400.0	40 000		3.5		Sea of Azov
Yalpuh lake	149.0	14 900	2.6	6.0		Danube
Total	5 761.5	576 147				

Source: Encyclopedia of Ukraine 1993; Ukrainian Wikipedia, 2016B

Table A1-4: Geographical distribution of ponds and small water reservoirs of Ukraine

Region	Ponds and small water reservoirs				On balance water management organizations		Leased (as of 01/01/2014)	
	Total No.	Area (ha)	Volume (10 ⁶ m ³)		No.	Area (ha)	No.	Area (ha)
			full	useful				
Ponds								
AR of Crimea	1 898	12 480	205.7	205.7	3	14	420	4 790
Vinnitsya	4 849	24 051	248.0	248.0			871	7 797
Volyn	867	5 077	57.2	57.2			550	3 674
Dnipro	3 292	18 812	274.8	274.8	1	14	835	7 661
Donets'k	2 146	12 200	270.4	270.4	2	24	1 011	7 249
Zhytomyr	1 822	12 106	152.9	152.9	61	1 096	638	4 625
Zakarpattia	584	1 617	22.0	22.0	1	8	584	1 617
Zaporizhzhya	1 174	9 235	159.8	159.8			296	3 113
Ivano-Frankivs'k	1 364	5 100	44.7	44.7			549	2 107
Kyiv	3 175	16 990	244.9	244.9	36	576	952	5 911
Kirovograd	2 761	17 896	205.1	205.1	-	-	1 329	9 332
Luhans'k	360	2 955	76.7	76.7	14	84	109	889
Lviv	3 055	9 120	115.2	115.2	2	9	892	3 400

Region	Ponds and small water reservoirs				On balance water management organizations		Leased (as of 01/01/2014)	
	Total No.	Area (ha)	Volume (10 ⁶ m ³)		No.	Area (ha)	No.	Area (ha)
			full	useful				
Mykolayiv	1 153	9 869	97.2	97.2	5	146	471	4 846
Odesa	992	12 118	198.0	198.0			103	1 459
Poltava	2 688	19 963	278.1	278.1	4	36	802	4 118
Rivne	1 549	8 525	91.0	91.0	9	263	1 032	5 482
Sumy	2 191	11 384	123.9	123.9	5	60	537	4 966
Ternopil	886	5 627	58.8	58.8			479	5 247
Kharkiv	2 538	13 174	228.6	228.6	2	58	1 013	6 420
Kherson	1 154	12 317	152.4	152.4			27	642
Khmelnysky	2 681	17 385	202.3	202.3	1	26	1 719	12 904
Cherkasy	2 984	17 456	246.6	246.6			1 877	11 433
Chernivtsi	1 243	4 524	45.2	45.2			604	3 512
Chernihiv	1 839	8 470	155.4	155.4	21	896	160	1 013
Kyiv Region	103	322	2.5	2.5				
c. Sevastopol	96	336	12.0	12.0				
Subtotal	49 444	289 109	3 969.4	3 969.4	167	3 310	17 860	124 207
Small water reservoirs								
AR of Crimea	22	3 614	334.2	306.9	13	2 610	1	65
Vinnitsya	52	9 658	293.0	136.0	4	3 305	6	616
Volyn	9	1 960	36.4	33.2	8	1 806	2	133
Dnipro	101	20 100	909.0	742.6	13	3 420	39	3 242
Donets'k	130	18 186	863.6	619.8	12	1 933	72	6 990
Zhytomyr	54	7 744	181.7	160.1	4	483	19	2 439
Zakarpattia	9	1 212	40.6	32.7	5	754	7	995
Zaporizhzhya	28	2 474	74.8	64.2			17	1 137
Ivano-Frankivs'k	3	1 631	63.5	15.4				
Kyiv	62	10 250	194.0	169.7	16	2 578	21	2 573
Kirovograd	84	9 501	264.3	213.0	3	350	57	4 306
Luhans'k	73	7 403	254.0	191.6	11	657	34	2 497
Lviv	20	3 288	67.1	56.7	3	303		
Mykolayiv	45	7 585	374.7	230.8	12	2 634	17	1 231
Odesa	64	58 704	2 106.7	934.1	10	1 340	11	1 498
Poltava	69	6 470	149.9	113.0	15	2 010	35	2 724
Rivne	12	2 925	47.8	38.2	7	972	4	380
Sumy	43	4 657	99.0	80.5	5	734	5	315
Ternopil	26	3 579	79.3	68.8			15	1 940
Kharkiv	57	33 050	1 497.3	1 357.0	23	28 600	31	3 220

Region	Ponds and small water reservoirs				On balance water management organizations		Leased (as of 01/01/2014)	
	Total No.	Area (ha)	Volume (10 ⁶ m ³)		No.	Area (ha)	No.	Area (ha)
			full	useful				
Kherson	15	13 743	138.3	66.2	7	1 877		
Khmelnysky	51	10 961	258.2	196.0			20	2 636
Cherkasy	38	5 918	118.7	85.8			6	586
Chernivtsi	3	168	7.8	4.9			2	138
Chernihiv	24	2 201	48.0	46.2	4	290	10	1 082
Kyiv Region								
c. Sevastopol	1	604	64.2	61.2				
Subtotal	1 095	247 586	8 566.1	6 024.6	175	56 656	431	40 743
Grand total	50 539	536 695	12 536	9 994	342	59 966	18 291	164 950

Source: NAME

Table A1-5: List of large water reservoirs of Ukraine

Name	Area (km ²)	Volume (10 ⁶ m ³)	Depth (m)		On river
			Avg.	Max.	
Kremenchukske	2 250.0	13 520.0	6.0	20.0	Dnipro
Zaporizke	410.0	3300.0	8.0	53.0	Dnipro
Kahovske	2 150.0	18 180.0	8.5	24.0	Dnipro
Kyivske	922.0	3730.0	4.0	14.5	Dnipro
Kanivske	675.0	2 620.0	3.9	21.0	Dnipro
Dniprodzerzhynske	567.0	2 450.0	4.3	16.0	Dnipro
Dnipro subtotal	6 974.0	43 800.0			
Lower Dnipro	492.0	-			Dnipro
Dnipro-Bug Liman	928.0		6-7	12.0	Dnipro, Bug
Dnistrovske	142.0	3 000.0	21.0	54.0	Dniester
Pechinezhske	86.2	380.0	4.4	20.0	Siverskyi Donets
Chervonooskilske	122.0	480.0	3.8	19.0	Oskol
Ladyzhynske	20.8	150.0	7.2	17.8	Southern Bug
Starobeshivske	8.5	40.0	7.0	18.0	Kalmius
Karachunivske	4.4	31.0	6.9	19.1	Ingulets
Simpferopol	3.2	40.0	11.0	38.0	Salgir
Partyzanske	2.2	30.0	15.0	40.0	Alma
Subtotal other water reservoirs	1 809.3	4 151.0	-	-	
Shterovska		24.0			
Zuyivska		6.7			
Kurahivska		83.0			
Myronivska		31.0			
Slavyanska		18.0			

Name	Area (km ²)	Volume (10 ⁶ m ³)	Depth (m)		On river
			Avg.	Max.	
Dobrotvirska		13.0			
Luhanska		24.0			
Starobishevka		44.0			It also included to big reservoirs.
Zmievska		53.0			
Kryvorizka		74.4			
Burshtynska		53.0			
Ladyzhynska		150.0			It also included to big reservoirs.
Vuhlegirska		168.0			
Subtotal of fuel burning power stations' cooling reservoirs		742.1			
Pivdenno-Ukrainska		79.0			
Chernobylska		58.0			Closed area
Khmelnyska		120.0			
Subtotal of nuclear power stations' cooling reservoirs		257.0			
Grand total	8 783.3	48 950.1	-	-	

Source: Nature of Ukrainian SSR. Sea and inland waters, 1987

Table A1-6: List of large water canals of Ukraine

Name	Length and water surface		Water storage capacity		Source of intake
	km	Estimated area (ha)	m ³ /sec	10 ⁶ m ³ /yr.	
Northern Crimean Canal	403.0		380		
Dipro-Donbas Canal	336.0		10		
Donets-Donbas Canal	133.0		27		
Kakhovka Magistrale Canal	130.0		360		
Dnipro-Kryvyi Canal	41.0	16.4			
Dnipro-Inhulets Canal	151.0	75.5			
Total	1 094.0		777		-
Source: Ukrainian Wikipedia, 2016					
Kakhovka main canal	129.7	#	520.0	8 200.0	Dnieper, Kakhovka reservoir
Dnieper-Donbass	263.0	#	120.0	2 742.0	Dnieper, Kakhovka reservoir
Dnieper-Krivoy Rog	42.9	#	41.0	929.0	Dnieprodzerzhinsk reservoir
Dnieper-Ingulets	40.0	#	37.0	1 008.0	Dnieper, Kakhovka reservoir
Dnieper-Donbass-Kharkov	142.0	#	8.6	239.0	Dnieper, Kremenchug reservoir
Dnieper-White Church	250.0	#	2.0	60.0	Dnieper, Kanev reservoir
Dnieper-Kirovograd	116.0	#	1.7	54.0	Kremenchug reservoir
Dnieper-West Donbass	70.0	#	1.4	48.8	Dnieper

Name	Length and water surface		Water storage capacity		Source of intake
	km	Estimated area (ha)	m ³ /sec	10 ⁶ m ³ /yr.	
Total	1 053.6	#	731.7	5 080.8	-

Source: FAO 2013

Table A1-7: List of pond fish farms in Ukraine

Name of farm	Total area (ha)	Drainability			Produced species and age groups ²⁷
		Yes (ha)	No (ha)	Yes (%)	
Bila Tserkva	1 600	1 046	554	65	
Vinnytsya	3 525	3 071	454	87	
Bar	561	561		100	
Volyn	860	860		100	
Dnipropetrovsk	192	192		100	
Krynychky	386	386		100	
Kryvyj Rig	425	425		100	
Petrykivka	763	763		100	
Samara	724	724		100	
Donetsk	3 642	3 642		100	
Zhytomyr	1 617	677	940	42	
Transcarpathian	360	360		100	
Zaporizhzhya	1 162	765	397	66	
Ivankiv	765	765		100	
Ivano-Frankivsk	981	981		100	
Kyivrybhoz	546	546		100	
Zabirja	465	346	119	74	
Kirovograd	711	711		100	
Crimea	2 994	2 773	221	93	
Lymanske	1 726	1 726		100	
Lviv	2 894	2 894		100	
Mykolaiv	257	257		100	
Odessa	392	392		100	
Poltavarybhoz	4 941	4 152	788	84	
Rivne	672	672		100	
Zdolbunivsilbud	36	36		100	
Yagotyn	799	799		100	
Sumy	926	926		100	
Ternopil	2 214	2 214		100	
Lymanske	22	22		100	

²⁷ **Abbreviations:** names; **CC** – common carp, **SC** – silver carp, **GC** – grass carp, **ST** – sturgeon, **P** – pike, **PP** – pikeperch, **ECF** – European catfish, etc. and names with age groups; **CC_L** - larvae, **CC_{AF}** – advanced fry, **CC_{1yr}** – one year old fish, **CC_{2yr}** – 2 year old fish, **CC_{TF}** – table fish

Name of farm	Total area (ha)	Drainability			Produced species and age groups ²⁷
		Yes (ha)	No (ha)	Yes (%)	
Pechenizke	624	624		100	
Chervonooskilske	114	114		100	
Kherson	1 416	1 317	99	93	
Pivdenne	547	547		100	
Khmelnyskyi	4 004	3 507	497	88	
Cherkassy	1 386	465	922	34	
Chernigiv	878	538	340	61	
Biloshapka	466	466		100	
Chernivtsi	501	501		100	
Farms of LRS²⁸	1 477	1 206	271	82	
Farms of FCC²⁹	4 557	4 557		100	
Total	53 125	47 524	5 601	89	

Source: NAME

Table A1-8: List of freshwater commercial and game fishes in Ukraine

Name		Commercial	Gamefish	Total
Scientific	FishBase			
<i>Abramis brama</i>	Freshwater bream	1	1	2
<i>Acipenser gueldenstaedtii</i>	Danube sturgeon	1		1
<i>Acipenser ruthenus</i>	Sterlet	1	1	2
<i>Acipenser stellatus</i>	Starry sturgeon	1		1
<i>Alburnoides bipunctatus</i>	Russian spirlin		1	1
<i>Alburnoides rossicus</i>	Spirlin		1	1
<i>Alburnus alburnus</i>	Bleak	1	1	2
<i>Alburnoides leobergi</i>	Azov shemaya	1	1	1
<i>Alburnoides sarmaticus</i>	Pontian shemaya	1	1	1
<i>Alosa immaculate</i>	Pontic shad	1		1
<i>Ameiurus nebulosus</i>	Brown bullhead	1	1	2
<i>Ameiurus melas</i>	Black bullhead		1	1
<i>Anguilla anguilla</i>	European eel	1	1	2
<i>Aspius aspius</i>	Asp	1	1	2
<i>Ballerus ballerus</i>	Zope	1	1	2
<i>Ballerus sapa</i>	White-eye bream	1	1	2
<i>Barbus barbus</i>	Barbel	1	1	2
<i>Barbus borysthenticus</i>	Dnieper barbel		1	1
<i>Barbus carpathicus</i>	Carpathian barbel		1	1
<i>Barbus waleckii</i>	Walecki's barbel		1	1

²⁸land reclamation system

²⁹fish-capture collectives

Name		Commercial	Gamefish	Total
Scientific	FishBase			
<i>Barbus tauricus</i>	Crimean barbus		1	1
<i>Blicca bjoerkna</i>	White bream	1	1	2
<i>Carassius carassius</i>	Crucian carp	1	1	2
<i>Carassius gibelio</i>	Prussian carp	1	1	2
<i>Chondrostoma nasus</i>	Nase	1	1	2
<i>Chondrostoma variable</i>	Volga nase	1	1	2
<i>Clupeonella cultriventris</i>	Black and Caspian Sea sprat	1		1
<i>Coregonus lavaretus</i>	European whitefish		1	1
<i>Ctenopharyngodon idella</i>	Grass carp	1	1	2
<i>Cyprinus carpio</i>	Common carp	1	1	2
<i>Esox lucius</i>	Northern pike	1	1	2
<i>Gobio gobio</i>	Common gudgeon		1	1
<i>Gobio carpathicus</i>	Carpathian gudgeon		1	1
<i>Gobio sarmaticus</i>	Dniester gudgeon		1	1
<i>Gobio brevicirrus</i>	Don gudgeon		1	1
<i>Gymnocephalus cernuus</i>	Common ruffe		1	1
<i>Gymnocephalus schraetser</i>	Schraetzer		1	1
<i>Gymnocephalus acerinus</i>	Longsnouted ruffe		1	1
<i>Hucho hucho</i>	Huchen		1	1
<i>Huso huso</i>	Beluga	1		1
<i>Hypophthalmichthys molitrix</i>	Silver carp	1		1
<i>Hypophthalmichthys nobilis</i>	Bighead carp	1		1
<i>Ictalurus punctatus</i>	Channel catfish		1	1
<i>Lepomis gibbosus</i>	Pumpkinseed		1	1
<i>Leuciscus aspius</i>	Asp	1	1	2
<i>Leuciscus idus</i>	Ide	1	1	2
<i>Leuciscus leuciscus</i>	Common dace		1	1
<i>Lota lota</i>	Burbot		1	1
<i>Mesogobius batrachocephalus</i>	Knout goby		1	1
<i>Misgurnus fossilis</i> *	Weatherfish		1	1
<i>Mugil cephalus</i>	Flathead grey mullet	1	1	2
<i>Mylopharyngodon piceus</i>	Black carp	1	1	2
<i>Neogobius gymnotrachelus</i>	Racer goby		1	1
<i>Neogobius kessleri</i>	Bighead goby		1	1
<i>Neogobius fluviatilis</i>	Monkey goby		1	1
<i>Neogobius melanostomus</i>	Round goby		1	1
<i>Oncorhynchus mykiss</i>	Rainbow trout		1	1
<i>Parasalmo mykiss</i>	Rainbow trout		1	1

Name		Commercial	Gamefish	Total
Scientific	FishBase			
<i>Pelecus cultratus</i>	Sabrefish	1	1	2
<i>Perca fluviatilis</i>	European perch	1	1	2
<i>Percarina demidoffii</i>	Percarina	1		1
<i>Percottus glenii</i>	Amur sleeper		1	1
<i>Platichthys flesus</i>	European flounder		1	1
<i>Rutilus rutilus</i>	Roach	1	1	2
<i>Rutilus virgo</i>	Cactus roach		1	1
<i>Sander lucioperca</i>	Pikeperch	1	1	2
<i>Sander volgensis</i>	Volga pikeperch		1	1
<i>Scardinius erythrophthalmus</i>	Rudd	1	1	2
<i>Silurus glanis</i>	Wels catfish	1	1	2
<i>Squalius cephalus</i>	Chub	1	1	2
<i>Thymallus thymallus</i>	European grayling		1	1
<i>Tinca tinca</i>	Tench	1	1	2
<i>Vimba vimba</i>	Vimba	1	1	2
Total		26	64	103

Source: Improved list of FishBase data 2016

Table A1-9: List of marine commercial and game fishes in Ukraine

Name		Commercial	Gamefish	Total
Scientific	FishBase			
Alosa maeotica	Black sea shad	1		1
Belone belone	Garfish	1	1	2
Conger conger	European conger		1	1
Dasyatis pastinaca	Common stingray	1	1	2
Diplodus annularis	Annular seabream		1	1
Diplodus sargus sargus	White seabream		1	1
Engraulis encrasicolus	European anchovy	1		1
Gobius cobitis	Giant goby	1	1	2
Merlangius merlangus	Whiting	1	1	2
Mugil cephalus	Flathead grey mullet	1	1	2
Mugil auratus	Golden grey mullet	1	1	2
Mugil saliens	Leaping mullet	1	1	2
Mugil so-iuy	So-iuy mullet	1	1	2
Mullus barbatus barbatus	Red mullet	1	1	2
Mullus surmuletus	Surmullet		1	1
Platichthys flesus	European flounder	1	1	2
Pomatomus saltatrix	Bluefish		1	1
Raja clavata	Thornback ray	1	1	2

Name		Commercial	Gamefish	Total
Scientific	FishBase			
Sarda sarda	Atlantic bonito	1	1	2
Sardina pilchardus	European pilchard	1		1
Scomber scombrus	Atlantic mackerel	1	1	2
Scophthalmus maximus	Turbot	1	1	2
Serranus scriba	Painted comber		1	1
Spicara maena	Blotched picarel		1	1
Spicara smaris	Picarel		1	1
Sprattus sprattus	European sprat	1		1
Squalus acanthias	Picked dogfish	1	1	2
Symphodus cinereus	Grey wrasse		1	1
Symphodus tinca	East Atlantic peacock wrasse		1	1
Trachinus draco	Greater weever		1	1
Trachurus mediterraneus	Mediterranean horse mackerel	1	1	2
Zeus faber	John dory		1	1
Subtotal – Marine fish species		20	28	48

Source: Improved list of FishBase data 2016

Table A1-10: Dynamics of fish catches between 1990 and 2015

Years	Total fish catch (tons)	Ocean fish catch (tons)	Azov-Black Sea basins (tons)	Inland water bodies (tons)
1990	1061.0	748.0	225.4	87.6
1991	905.0	640.0	192.2	72.8
1992	546.0	386.0	117.4	42.6
1993	451.0	347.0	71.8	32.2
1994	302.0	213.0	42.9	46.1
1995	400.1	302.2	30.1	67.8
1996	390.8	316.1	19.6	55.1
1997	420.0	348.1	30.2	41.7
1998	386.0	309.5	35.8	40.7
1999	342.0	254.4	45.1	42.5
2000	350.0	254.9	56.9	38.2
2001	333.4	160.5	134.6	38.3
2002	293.2	162.1	93.1	38.0
2003	250.0	155.5	55.0	39.5
2004	226.0	138.1	52.5	35.4
2005	265.6	167.0	61.2	37.4
2006	228.8	145.3	46.8	36.7
2007	213.6	123.5	46.9	43.2
2008	244.5	148.3	55.0	41.2

Years	Total fish catch (tons)	Ocean fish catch (tons)	Azov-Black Sea basins (tons)	Inland water bodies (tons)
2009	256.8	147.3	67.3	42.2
2010	218.6	110.6	69.7	38.3
2011	211.2	98.7	75.0	37.5
2012	203.9	98.9	63.4	41.6
2013	225.8	101.3	78.8	45.7
2014	91.3	29.5	22.2	39.6
2015	88.5	15.8	34.2	38.5

Source: State Statistics Service of Ukraine 2016

Table A1-11: Restocking of inland water bodies and Azov-Black Sea basins by state fish reproduction centers in #####

Species		Number of fish (1'000 pcs.)	
Local name	Scientific name	Produced	Released in the wild
Corop (age 0+)	<i>Cyprinus carpio</i>	1 243.4	1 243.4
Corop (age 1+)	<i>Cyprinus carpio</i>	419.2	419.2
Strokatyi tovtolob (age 0 +)	<i>Hypophthalmichthys molitrix</i>	3 688.6	3688.6
Strokatyi tovtolob (age 1 +)	<i>Hypophthalmichthys molitrix</i>	765.4	765.4
Bilyi amyr (age 0 +)	<i>Ctenopharyngodon idellus</i>	645.8	645.8
Bilyi amyr (age 1 +)	<i>Ctenopharyngodon idellus</i>	136.2	136.2
Sudak (juveniles)	<i>Sander lucioperca</i>	111.2	111.2
Shchuka (fingerlings)	<i>Esox lucius</i>	954.3	954.3
Shchuka (juveniles)	<i>Esox lucius</i>	25.9	25.9
Som (fingerlings)	<i>Silurus glanis</i>	10.4	10.4
Sterliad (fingerlings)	<i>Acipenser ruthenus</i>	1 467.5	1 467.5
Forel strumkova (juveniles)	<i>Salmo trutta</i>	60.4	60.4

Source: State Statistic Service of Ukraine 2016

Table A1-12: Landing of main commercial fish species from Dnieper reservoirs in 2015

Species		Landing (tons)	% of total landing
Scientific name	English name		
<i>Abramis brama</i>	Freshwater bream	2 491.2	25.43
<i>Rutilus rutilus</i>	Roach	2 209.4	22.56
<i>Carassius auratus</i>	Crucian carp	2 096.4	21.40
<i>Blicca bjoerkna</i>	White beam	836.9	8.54
<i>Sander lucioperca</i>	Pike-perch	341.9	3.49
<i>Silurus glanis</i>	Wels catfish	182.4	1.86
<i>Ballerus ballerus</i>	Zope	141.3	1.44
<i>Esox lucius</i>	Northern pike	79.0	0.80
<i>Pelecus cultratus</i>	Sichel	76.3	0.78
<i>Cyprinus carpio</i>	Common carp	76.0	0.78

Species		Landing (tons)	% of total landing
Scientific name	English name		
Subtotal		8 530.8	87.08
Other fish species		1 264.5	12.92
Total landing of fish species		9 795.3	100.00

Table A1-13: Landings of main commercial fish species from inland waters other than Dnieper reservoirs in 2015

Species		Landing (tons)	% of total landing
Scientific name	English name		
<i>Carassius auratus</i>	Crucian carp	1.237.31	33.35
<i>Clupeonella cultriventris</i>	Black Sea tulka	1.126.95	30.38
<i>Abramis brama</i>	Freshwater bream	267.19	7.20
<i>Atherina boyeri</i>	Atherina	263.63	7.11
<i>Alosa immaculate</i>	Pontic shad	169.92	4.58
<i>Rutilus rutilus</i>	Roach	86.75	2.34
<i>Cyprinus carpio</i>	Common carp	66.88	1.80
<i>Blicca bjoerkna</i>	White beam	47.73	1.29
<i>Sander lucioperca</i>	Pike-perch	38.58	1.04
<i>Alosa spp.</i>	Shads nei	38.21	1.03
<i>Gobiidae spp.</i>	Gobies	33.05	0.89
<i>Perca fluviatilis</i>	European perch	27.06	0.73
<i>Mugilidae spp.</i>	Mulletts nei	16.21	0.44
<i>Silurus glanis</i>	Wels catfish	15.34	0.41
Other fish species		275.99	7.41
Total		3 710.08	100.0

Table A1-14: Estimated stocks and established limits of the most important fish species in Dnieper reservoirs in 2015

Fish Species		Estimated stocks (tons)	Established limits (tons)
Scientific name	English name		
<i>Carassius auratus</i>	Crucian carp	13 244	3 311
<i>Abramis brama</i>	Freshwater bream	11 056	2 764
<i>Rutilus rutilus</i>	Roach	10 264	2 566
<i>Blicca bjoerkna</i>	White beam	4 040	1 010
<i>Sander lucioperca</i>	Pike-perch	1 652	413
<i>Silurus glanis</i>	Wels catfish	1 008	252
<i>Cyprinus carpio</i>	Common carp	696	174
<i>Ballerus ballerus</i>	Zope	688	172
<i>Esox lucius</i>	Northern pike	416	104
<i>Pelecus cultratus</i>	Sichel	416	104
Total		43 480	10 870

Source: Institute of Fisheries of the National Academy of Agrarian Sciences of Ukraine (Kyiv)

Table A1-15: Approximate number of fishing companies on the different large inland waters in 2015

Water body	Fishing companies (No.)
Kyivske	30
Kanivske	28
Kremenchucke	58
Dniprodzerzhinske	33
Zaporizhzhе	15
Kakhovske	51
Subtotal of Dnieper water reservoirs	215
Dniester (with Dniester reservoir and Kuchurgansky reservoir)	25
Danube	20
Dnieper-Bug estuary system	34
Black Sea limans (firths)	16
Dnieper	4
Desna	2
Not specified water bodies	16
Subtotal other inland waters	117
Total	332

Table A1-16: Approximate number of fishing gears and vessels on Dnieper reservoirs in 2015

Vessels, fishing gears	Dnieper reservoirs					
	Kyivske	Kanivske	Kremen-chucke	Dniprodzerzhinske	Zaporizhzhе	Kakhovske
Big fishing vessels (≥ 10 m), units	68	2	51	18	13	35
Small fishing vessels (< 10 m), units	153	125	517	173	113	418
Gillnets	7 670	5 100	17 810	5 460	4 000	14 110
Beach seines	6	5	5	23	45	19
Fyke nets	50	46	40	93	40	1 350
Pound nets	1	1	2	2	10	100
Traps	70	-	-	-	20	250
Other fishing gears (active)	2	4	22	22	10	67
Other fishing gears (passive)	50	50	250	50	-	50

Table A1-17: Estimated number of required restocking material of carps and their expectable feasible production in inland waters of Ukraine

Type of fish farm and natural water bodies	Weight of restocking fish (gr)	Quantity (1'000'000 pcs.)						Feasible production (1'000 tons)
		Silver carp	Bighead carp	Hybrid	Grass carp	Common carp	Total	
Pond farms	25	144.1	82.2	3.6	10.4	183.6	423.9	100.7
	70	-	-	16.5	0.8	33	50.3	36.3
Dnieper's reservoirs	130-150	35.0	8.9	-	5.2	-	49.1	46.7
Pond farms at the bank of Dnieper's reservoirs	25	7.1	1.9	0.7	0.6	17.7	28.0	7.0

Type of fish farm and natural water bodies	Weight of restocking fish (gr)	Quantity (1'000'000 pcs.)						Feasible production (1'000 tons)
		Silver carp	Bighead carp	Hybrid	Grass carp	Common carp	Total	
Black and Azov Sea ³⁰ estuarial systems	30-50	31.5	21.6	-	-	7.5	60.6	14.8
Cooler-water bodies at power station	100	2.5	1.1	-	-	-	3.6	3.4
Total³¹		220.2	115.7	20.8	17.0	241.8	615.5	208.9

Table A1-18: Allowable minimum size of game fishes to be taken by amateur and sport fishers of Ukraine

Fish species and water invertebrates	Water bodies			
	Inland water bodies	the Black Sea (including Danube river)	the Sea of Azov	
Goatfish	-	8.5	-	8.5
Volga zander	28	-	-	25
Gobies	-	11	-	8
Linen	30	40	-	35
Grass carp	40	45	-	-
Eel	50	50	-	-
Ide	28	24	22	22
Chub	24	28	-	-
Flounder-gloss	-	15	-	17
Carp	-	10	-	-
Prussian carp	-	15	-	-
Dogfish	-	85	-	-
Mullet	-	20	-	20
Mugil so-iuy	-	38	-	33
Carp	25	25	-	25
Rockling	20	20	13	17
Bream	32	30	20	28
Whiting	-	12	-	-
Herring	-	17	16	14
Undermouth	25	25	-	-
Taran	18	-	-	-
Shad	-	11	-	-
Vimba	-	22	-	22
Wild carp	35	32	30	30
Whitefish	-	25	-	-
Zope	22	24	-	24

³⁰ Including Danube lakes

³¹ - Moreover using of restocking material of pike (45 million larvae), pike perch (50 million fingerlings), mullet (30 million fingerlings), Wels (7.5 million fingerlings) and 1.5 (1.3 million fingerlings and 0.2 million two-summerold fish) can ensure additional production about 12-15 thousand tons.

Fish species and water invertebrates	Water bodies			
	Inland water bodies	the Black Sea (including Danube river)		the Sea of Azov
Mackerel	-	15	-	15
Catfish	70	60	50	60
Scad	-	10	-	10
Zander	42	38	30	38
Roach	18	18	-	14
Silver Carp	40	40	-	40
Sabrefish/Rasorfish	24	24	-	-
Pike	35	32	-	-
Anodonta	-	12	-	-
Shrimp	-	3.5	-	-
Mussel	-	5	-	-
Freshwater mussel	-	7	-	-
Crayfish	10	10	9	9

Table A1-19: Dynamics of aquaculture production by regions of Ukraine³²

Region	2012			2013			2014			2015		
	Area (ha)	Tons	kg/ha	Area (ha)	Tons	kg/ha	Area (ha)	Tons	kg/ha	Area (ha)	Tons	kg/ha
Kyiv	0	0		67	45	678	61	45	744	142	39	275
AR of Crimea	4 017	680	169	2 205	700	317	0	0		0	0	
Vinnitsya	11 452	2 422	212	11 655	2 775	238	7 934	2 365	298	8 900	1 693	190
Volyn	589	263	447	1 351	650	481	1 203	770	640	1 542	789	512
Dnipro	5 228	811	155	1 416	573	405	1 174	268	228	985	214	217
Donets'k	5 066	1 752	346	2 082	1 801	865	2 347	1 532	653	3 306	1 430	433
Zhytomyr	2 520	649	258	2 058	883	429	1 922	692	360	2 878	621	216
Zakarpattia	943	369	391	710	548	772	467	399	854	612	356	581
Zaporizhzhya	5 008	2 067	413	2 957	621	210	1 622	467	288	1 832	392	214
Ivano-Frankivs'k	1 385	816	589	982	543	553	1 037	592	571	1 230	539	438
Kyiv Region	4 447	2 511	565	1 322	724	548	2 202	1 068	485	1 926	555	288
Kirovograd	1 738	1 695	976	5 163	715	139	2 646	751	284	2 780	1 089	392
Luhans'k	1 230	1 230	1 000	1 590	706	444	0	0		302	36	118
Lviv	4 898	2 016	412	2 216	1 081	488	2 110	722	342	4 473	828	185
Mykolayiv	2 513	2 122	844	2 746	2 169	790	2 323	1 972	849	3 076	338	110
Odesa	4 032	923	229	4 582	1 390	303	3 041	989	325	5 959	860	144
Poltava	8 680	2 340	270	7 016	535	76	2 637	413	157	2 794	63	23
Rivne	2 360	916	388	654	431	660	615	385	626	1 440	267	185
Sumy	4 342	3 234	745	3 768	2 519	669	3 734	2 181	584	4 415	2 722	617

³²According to the State Statistics Service of Ukraine data are from the report of FISHSTAT AQ FAO/CWP form for reporting statistics on aquaculture, data from the report № 1A – fish (annually) «Producing of aquaculture»

Region	2012			2013			2014			2015		
	Area (ha)	Tons	kg/ha	Area (ha)	Tons	kg/ha	Area (ha)	Tons	kg/ha	Area (ha)	Tons	kg/ha
Ternopil	3 038	3 038	1 000	2 936	909	310	1 982	462	233	1 922	358	186
Kharkiv	1 511	838	554	3 109	925	298	3 007	918	305	1 719	429	249
Kherson	8 327	4 210	506	4 518	785	174	3 759	685	182	5 462	556	102
Khmelnysky	11 950	460	38	5 080	849	167	7 784	751	96	2 973	614	207
Cherkasy	7 130	2 604	365	4 491	2 478	552	4 364	2 761	633	4 763	2 123	446
Chernivtsi	939	1 185	1 262	1 346	773	574	1 370	785	573	2 728	1 012	371
Chernihiv	2 674	1 138	426	1 461	1 037	710	1 391	1 003	721	944	996	1 055
Total	106 014	40 286	380	77 480	27 167	351	60 730	22 975	378	69 099	18 917	274

Table A1-20: Landing of main commercial fish species by Ukraine in the basin of the Sea of Azov in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
Gobiidae (mostly <i>Neogobius melanostomus</i>)	Gobies (mostly round goby)	18113.57	60.67
<i>Clupeonella cultriventris</i>	Black Sea tulka	10598.22	35.50
<i>Engraulis encrasicolus</i>	European (Azov) anchovy	1039.91	3.48
<i>Rutilus rutilus heckelii</i>	Black Sea roach	47.08	0.16
<i>Liza haematocheilus</i>	So-iuy mullet	39.07	0.13
<i>Mugilidae spp.</i>	Mulletts nei	14.34	0.05
Other fish species ³³		2.58	0.01
Total landing of fish species		29854.77	100.00

Table A1-21: Approximate effectiveness of fishing gears for commercial catching of main fish species in the Sea of Azov³⁴ in 2015

Fishing gears	Proportion of total landing of the main fish species fish species (%)					
	Gobies	Black Sea tulka	European anchovy	Black Sea roach	So-iuy mullet	Mulletts nei
Midwater trawls, units		15	60	15	5	
Gillnets, units					75	100
Purse seines, units		35	40			
Beach seines, units	20			5		
Danish seines, units	60					
Fyke nets, units	15			10	20	
Traps	5					
Pound nets		50		70		
Total	100	100	100	100	100	100

³³ Most important species in this category are: *Alosa pontica* (Pontic shad), *Sander lucioperca* (Pike-perch), *Scophthalmus maeotica torosa* (Azov turbot) etc.

³⁴ Statistical Mediterranean subarea 30

Table A1-22: Landing of water invertebrates by Ukraine in the basin of the Sea of Azov in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
Chironomidae spp.	Chironomids	413.97	99.07
Gammaridae spp.	Gammarids	2.00	0.48
Pontogammarus maeoticus	Pontogammarus	1.89	0.45
Total landing of invertebrates		417.86	100.00

Table A1-23: Fish stocks and catch limits for 2015 established for the Sea of Azov

Species		Stocks (tons)	Limits (total for Ukraine and Russian Federation)	
Scientific name	Scientific name		tons	% of stock
<i>Engraulis encrasicolus</i>	European (Azov) anchovy	240 000.0	65 000.0	27
<i>Clupeonella cultriventris</i>	Black Sea tulka	220 000.0	60 000.0	27
<i>Gobiidae</i> ³⁵	gobies	80 000.0	24 000.0	30
<i>Rutilus rutilus heckelii</i>	Black Sea roach	8 450.0	1 690.0	20
<i>Alosa immaculate</i>	Pontic shad	2 700.0	675.0	25
<i>Liza haematocheilus</i>	So-iuy mullet	2 000.0	400.0	20
<i>Sander lucioperca</i>	Pike-perch	550.0	55.0	10
<i>Abramis brama</i>	Freshwater bream	450.0	45.0	10
<i>Scophthalmus maeotica torosa</i>	Azov turbot	60.0	6.0	10
<i>Vimba vimba</i>	Vimba	60.0	6.0	10
<i>Pelecus cultratus</i>	Sichel	3.0	0.3	10
Total		554 273.0	151 877.3	27

Table A1-24: Traditional structure of Ukrainian fishing in the Black Sea

No	Target species	Fishing grounds	Fishing gears
1	<i>Alosa immaculate</i>	The Black Sea (except the Karkinitsky Bay)	Shad gillnets
2	<i>Engraulis encrasicolus</i> , <i>Liza haematocheilus</i> , <i>Sarda sarda</i> , <i>Scomber scombrus</i> , <i>Pomatomus saltatrix</i>	The Black Sea (except for the Karkinitsky Bay)	Purse seines
3	<i>Engraulis encrasicolus</i>	In the Black Sea eastwards of the meridian which passes through Khersones Cape	Purse seines
4	<i>Gobiidae</i>	The Black Sea, Black Sea estuaries	Trap nets, beach seines, gobies gillnets
5	<i>Merlangius merlangus</i> , <i>Sprattus sprattus phalericus</i>	The Black Sea (except for the grounds closed for the trawl fisheries)	Midwater and midwater pair trawls
6	<i>Mugilidae</i>	The Black Sea	Trap nets, beach seines
7	<i>Liza haematocheilus</i>	The Black Sea	Trap nets

³⁵ Stock of Gobies is noted only for the open part of the Sea of Azov, without 5-km coastal zone and firths, where the parties are assessing stocks and limits of gobies separately the stock of gobies in Ukrainian firths and coastal 5 km zone was assessed on the level no less 25.000.00 tons.

No	Target species	Fishing grounds	Fishing gears
8	<i>Liza haematocheilus</i> , <i>Trachurus mediterraneus</i> <i>ponticus</i>	The Black Sea	Cast nets
9	<i>Liza haematocheilus</i> , <i>Platichthys flesus luscus</i>	The Black Sea (except for the Karkinitzky Bay)	Gill nets
10	<i>Mullus barbatus ponticus</i>	The Black Sea	Beach seines
11	<i>Scophthalmus maeoticus</i>	The Black Sea	Turbot gillnets
12	<i>Rajiformes</i> , <i>Squalus acanthias</i>	The Black Sea southwards the line joining Tarkhankut Cape and the Dniester-Tzargorod Lighthouse and eastwards the meridian 30° 00' E	Long lines, bottom nets for dogfish
13	<i>Trachurus mediterraneus</i> <i>ponticus</i>	The Black Sea from Meganom Cape to Cape Lukul	Lift cone-shaped nets with electric light attraction
14	<i>Mytilus galloprovincialis</i> , <i>Rapana venosa</i>	The Black Sea	Hand harvesting
15	<i>Mytilus galloprovincialis</i> , <i>Rapana venosa</i>	The Black Sea (except for the Karkinitzky Bay)	Khizhyak's dredge
16	<i>Palaemon adspersus</i>	The Black Sea (coastal zone)	Trap nets

Table A1-25: Data of the Ukrainian fleet in the Black Sea (2015)

Fleet segments	Quantity of vessels	Landing as proportion of total (%)
Polyvalent small-scale vessels without engine (< 12 meters)	12	< 1%
Polyvalent small-scale vessels with engine (< 6 meters)	58	< 1%
Polyvalent small-scale vessels with engine (6-12 meters)	143	~ 26%
Polyvalent vessels (>12 meters)	9	~ 72%
Total	222	100

Table A1-26: Landing of main commercial fish species by Ukraine in the Black Sea³⁶ in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Sprattus sprattus</i>	European sprat	2236.85	80.05
<i>Engraulis encrasicolus</i>	European anchovy	247.55	8.86
<i>Psetta maxima</i>	Turbot	88.53	3.17
<i>Gobiidae (mostly Neogobius melanostomus)</i>	Gobies(mostly round goby)	78.73	2.82
<i>Atherina boyeri</i>	Atherina	63.17	2.26
<i>Mugilidae spp.</i>	Mulletts nei	43.89	1.57
<i>Dasyatis pastinaca</i>	Stingray	10.51	0.38
<i>Alosa pontica</i>	Pontic shad	8.56	0.31
<i>Squalus acanthias</i>	Picked dogfish	4.01	0.14
<i>Alosa spp</i>	Shads nei	2.02	0.07

³⁶Statistical Mediterranean sub-area 29.

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Liza haematocheilus</i>	So-iuy mullet	1.44	0.05
<i>Trachurus mediterraneus</i>	Horse mackerel	1.33	0.05
Other fish species ³⁷		7.77	0.27
Total		2794.36	100.00

Table A1-27: Landing of water invertebrates in the basin of the Black Sea in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Mytilus galloprovincialis</i>	Mediterranean mussel	534.83	42.78
<i>Rapana spp.</i>	Sea snails	369.22	29.53
<i>Palaemon adspersus</i>	Baltic prawn	240.90	19.27
<i>Rhizostoma pulmo</i>	Rhizostoma	86.34	6.91
<i>Pontogammarus maeoticus</i>	Pontogammarus	12.86	1.03
<i>Chironomidae spp.</i>	chironomids	5.99	0.48
Total		1.250.14	100.00

Table A1-28: Base stock levels and catch limits for the main fish species established for the Black Sea in 2015

Species		Stock ³⁸ (tons)	Limit
Scientific name	English name		
<i>Sprattus sprattus</i>	European sprat	76.000.00	No limited
<i>Psetta maxima</i>	Turbot	1.678.00	140.00
<i>Mugilidae spp.</i>	Mullets nei	700.00	No limited
<i>Mullus barbatus</i>	Red mullet	350.00	No limited
<i>Platichthys flesus</i>	European flounder	-	6.00
Other exploitable fish species		-	No limited

Table A1-29: Landing of main commercial species of aquatic living resource by Ukraine in the oceanic fishing area 34 in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Sciaenidae</i>	Croakers, drums nei	8 237.0	54.22
<i>Scomberomorus tritor</i>	West African Spanish mackerel	6231.0	41.01
<i>Selene dorsalis</i>	African moonfish	389.0	2.56
<i>Sparidae</i>	Porgies, seabreams nei	146.0	0.96
<i>Pomatomus saltatrix</i>	Bluefish	94.0	0.62
<i>Stromateus fiatola</i>	Blue butterfish	93.0	0.61
Other fish species		3.0	0.02
Total		15 193.0	100.00

³⁷ Most important species in this category are: *Alosa pontica* (Pontic shad), *Sander lucioperca* (Pike-perch), *Scophthalmus maeotica torosa* (Azov turbot) etc.

³⁸ Stocks assessed by the Institute of Fisheries and Marine Ecology (IFME, Berdyansk).

Table A1-30: Landing of main commercial species of aquatic living resources by Ukraine in the oceanic fishing area 41 in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Dissostichus eleginoides</i>	Patagonian toothfish	142.00	18.07
Other fish species		644.00	81.93
Total		786.00	100.00

Table A1-31: Landing of main commercial species of aquatic living resources by Ukraine in the oceanic fishing area 81 in 2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Trachurus declivis</i>	Greenback horse mackerel	12973.00	100.00

Table A1-32: Landing of main commercial species of aquatic living resources by Ukraine in the oceanic fishing area 48 and 88³⁹ in the fishing season 2014/2015

Species		Landing (tons)	Proportion of total landing (%)
Scientific name	English name		
<i>Euphasia superba</i>	Antarctic krill	12523.0	98.04
<i>Dissostichus mawsoni</i>	Antarctic toothfish	205.0	1.60
<i>Dissostichus eleginoides</i>	Patagonian toothfish	4.0	0.03
Other fish species		41.0	0.33
Total		12 773.0	100.00

Table A1-33: Ukrainian Fishery Fleet in 2015

Vessel length (m)	Total number	Trawlers	Seiners		Gillnets	Multi-purpose vessels	Dredges	Other vessels
			Purse seines	Other seiners				
< 5.9 m	1 414 ^(P) 130 ^(NP)				1 544			
6.0-11.9	2 328 ^(P) 21 ^(NP)				2 349			
< 11.9	74				50	24		
12.0-17.9	117				83	32	2	
18.0-23.9	65	3	36		2	17		7
24.0-29.9	28	2	3			2		21
30.0-35.9	13	1	6	1				5
36.0-44.9	1							1
45.0-59.9	7	1						6
> 75	9	9						
Total	4 207	16	45	1	4 028	75	2	40

Source: FishStat FF-1 and FishStat FF-2 2016

³⁹CCAMLR-area

TableA1-34: Frequency of eating fish and fish products in 2015

Type of product	Daily	Weekly	Monthly	Yearly	On holydays
	%				
Fresh fish	4	18	58	14	6
Frozen fish	1	15	54	30	18
Smoked fish	2	19	44	39	29
Salted fish	4	18	46	33	9
Jerky fish, canned fish, Fish preserves, Frozen seafood, crab sticks, luminaria	1-4	13-14	36-40	44-47	11-19

TableA1-35: Average price of fish and fish products in 2014-2015

Marketable groups	2014		2015		2015/2014 (%)	
	kg/USD				Export	Import
	Export	Import	Export	Import		
Fish, crustacean, mollusks and other aquatic invertebrates	1.25	1.93	2.41	1.38	192.7	71.3
% of export price:	154		57		37	
Fish, fresh or chilled, excluding filleted and other fish meat	0.85	6.41	0.84	4.99	98.1	77.9
% of export price:	754		594		79	
Fish frozen, excluding filleted and other fish meat	1.31	1.57	1.16	1.09	88.5	69.3
% of export price:	120		94		78	
Fish fillets and other fish meat; minced, fresh, chilled or frozen	7.29	2.10	4.29	1.97	58.9	93.6
% of export price:	29		46		159	
Prepared or tinned fish; black caviar and its substitutes	1.15	2.18	1.40	1.72	121.4	78.9
% of export price:	190		123		65	
Total	1.23	1.97	2.05	1.42	166.8	72.0
% of export price:	160		69		43	

TableA1-36: Dynamics of imports of the main marketable groups of fish commodities in Ukraine between 2011 and 2015

Marketable groups	2011		2012		2013		2014		2015		2015 – 2014	
	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	% of weight	% of value
Fish, crustacean, mollusks and	346.8	505.4	382.7	687.6	415.3	863.4	307.2	593.8	210.4	289.8	68.5	48.8

Marketable groups	2011		2012		2013		2014		2015		2015 – 2014	
	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	% of weight	% of value
other aquatic invertebrates												
Fish, fresh or chilled, excluding filleted and other fish meat	14.1	76.6	25.7	134.5	23.2	149.1	14.4	92.5	10.6	53.2	73.8	57.5
Fish, frozen, excluding filleted and other fish meat	273.2	313.3	302.6	430.1	329.8	562.2	244.8	383.4	181.4	196.9	74.1	51.4
Fish fillets and other fish meat; minced, fresh, chilled, frozen	44.1	67.4	42.5	77.6	48.5	99.4	37.2	78.3	13.1	25.7	35.1	32.8
Prepared or tinned fish; black caviar and its substitutes	38.2	81.3	35.2	87.4	40.3	91.8	31.3	68.2	15.5	26.6	49.5	39.1
Total	395.1	606.1	429.8	800.6	469.4	988.9	348.5	685.3	230.2	326.1	66.1	47.6

Source: State Statistic Service of Ukraine 2016

Table A1-37: Trout import in 2015

Country	Total		Fresh or chilled		Frozen		Fish fillets and other fish meat		Dried, salted or in brine	
	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD
Belarus	5.5	63.8	-	-	-	-	-	-	5.5	63.8
UK	46.4	157.8	-	-	42.5	143.9	4.0	13.9	-	-
Denmark	337.4	1 096.5	300.7	956.8	36.7	139.7	-	-	-	-
Estonia	8.1	6.0	-	-	8.1	6.0	-	-	-	-
Italy	30.4	149.4	30.4	149.4			-	-	-	-
Norway	2 991.2	13 118.1	2 771.3	12 720.8	217.4	383.2	1.5	5.2	1.0	8.9
Finland	0.2	0.1	-	-	0.2	0.1	-	-	-	-
Turkey	73.7	256.7	73.7	256.7	-	-	-	-	-	-
Chile	132.1	358.3	-	-	132.1	358.3	-	-	-	-
Total	3 624.8	15 206.4	3 176.1	14 083.7	436.8	1 031.2	5.4	18.7	6.5	72.8

Table A1-38: Trout exports in 2015

Country	Total		Fresh or chilled		Frozen		Dried, salted or in brine	
	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD
Azerbaijan	0.0	0.3					0.012	0.300
Armenia	0.2	2.4					0.180	2.400
Georgia	0.4	7.4					0.424	7.400
Turkey	0.0	0.1	0.011	0.100				

Country	Total		Fresh or chilled		Frozen		Dried, salted or in brine	
	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD	tons	1'000 USD
Japan	0.0	0.3	0.021	0.300				
USA	4.1	34.8					4.115	34.800
Panama	0.1	0.6			0.120	0.600		
Total	5.8	62.9	0.032	0.400	0.120	0.600	5.694	61.900

TableA1-39: Dynamics of export of the main marketable groups of fish commodities in Ukraine in 2011-2015

Marketable groups	2011		2012		2013		2014		2015		2015/2014	
	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD	1'000 tons	1'000 USD
Fish, crustacean, molluscs and other aquatic invertebrates	18.9	19.6	18.2	18.7	16.4	20.8	21.9	27.4	5.3	12.9	24.6	47.4
Fish, fresh or chilled, excluding filleted and other fish meat	18.1	15.7	15.4	13.3	13.6	11.7	20.2	17.2	2.6	2.2	13.1	12.9
Fish, frozen, excluding filleted and other fish meat	0.2	0.1	2.1	1.1	1.6	1.1	0.2	0.3	0.2	0.2	88.2	78.1
Fish fillets and other fish meat; minced, fresh, chilled, frozen	0.3	2.9	0.5	3.7	0.7	6.6	1.1	8.7	1.8	8.1	156.5	92.2
Prepared or tinned fish; black caviar and its substitutes	29.9	39.5	37.3	46.2	34.9	42.9	17.6	20.3	3.2	4.5	18.6	22.5
Total	49.1	61.5	55.7	66.1	51.4	65.1	39.6	48.6	8.6	17.7	21.9	36.6

Source: State Statistics Service of Ukraine 2016

Table A1-40: Export of pike perch fillet

Years	2010	2011	2012	2013	2014	2015
	Tons					
Exports of freshwater perch fillets (fresh, chilled or frozen)	182.5	216.3	477.7	752.6	1 127.3	1 392.5

Table A1-41: List of institutes of higher education on fisheries and aquaculture

Level	Name of institute	Faculty	Department	Name of courses, degrees and specialties
Junior Specialist	Nemishaivo Agrotechnical College (Kyiv region)			Specialty 5.09020101 "Fish Farming and Aquaculture"

Level	Name of institute	Faculty	Department	Name of courses, degrees and specialties
Junior Specialist	Bilhorod-Dnistrovskiy Marine Fishing Technical College (Odesa)			Specialty 5.09020101 “ <u>Fish Farming and Aquaculture</u> ”, qualification “ <u>Technician-Aquaculturist</u> ” Specialty 5.09020102 “ <u>Exploitation of commercial fishing and aquaculture equipment</u> ”, qualification Technician-Mechanic Specialty 5.05170110 “ <u>Storage, preservation, and processing of fish and seafood</u> ”, qualification “ <u>Technician-Technologist</u> ”
Junior Specialist	Mlyniv State Technological-Economical College (Rivne region)			Specialty 5.09020101 “ <u>Fish Farming and Aquaculture</u> ”
Junior Specialist	O. Solyanyk Odesa Maritime College of Fish Industry			Specialties 5.07010401 “ <u>Marine navigation</u> ”; 5.07010403 “ <u>Exploitation of ship power plants</u> ”, 5.07010407 “ <u>Exploitation of ship electric and automatic equipment</u> ”, 5.05060403 “ <u>Assemblage and maintenance of refrigerant and compressor machines and equipment</u> ”
Junior Specialist	Kherson Maritime College of Fish Industry			Specialty 5.07010401 “ <u>Marine navigation</u> ”, 5.07010403 “ <u>Exploitation of ship power plants</u> ”
Bachelor and higher degree	Bila Tserkva National Agrarian University	Ecology	Ichthyology and Zoology	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Specialist degree diploma in “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	Vinnitsa National Agrarian University	Technology of Animal Product Manufacture and Processing	Feeding of Livestock and Aquatic Bioresources	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Master degree diploma in “ <u>Aquaculture</u> ”
Bachelor and higher degree	Dnipropetrovsk State Agrarian Economical University	Biotechnology	Aquatic Bioresources and Aquaculture	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ”
Bachelor and higher degree	Sumy National Agrarian University	Biology and Technology	Breeding and Selection of Animals and Aquatic Bioresources	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ”
Bachelor and higher degree	S.Z.Gzhytskiy National Veterinary and Biotech University of Lviv	Biology and Technology	Aquatic Bioresources	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Master degree diploma in “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	Zhytomyr National Agroecology University	Ecology and law	Aquatic Bioresources and Aquaculture	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ”

Level	Name of institute	Faculty	Department	Name of courses, degrees and specialties
Bachelor and higher degree	National University of Life and Environmental Sciences of Ukraine	Animal Husbandry and Aquatic Bioresources	1) Aquaculture 2) Hydrobiology and Ichthyology	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Master degree diploma in “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	National University of Water and Environmental Engineering	Institute of Agro-ecology and Land Utilization	Aquatic Bioresources	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Specialist degree diploma in “ <u>Aquatic Bioresources</u> ” Master degree diploma in “ <u>Aquatic Bioresources</u> ” and “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	Odesa State Environmental University	Environment	Aquatic Bioresources and Aquaculture	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Specialist degree diploma in “ <u>Aquatic Bioresources</u> ” Master degree diploma in “ <u>Aquatic Bioresources</u> ” and “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	Kharkiv State Zoo-veterinary Academy	Biotechnology and Environmental Management	Applied Biology, Aquatic Bioresources and Game Management	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Master degree diploma in “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	Kherson State Agrarian University	Fisheries and Environmental Management	Aquatic Bioresources and Aquaculture	Bachelor degree diploma in “ <u>Aquatic Bioresources and Aquaculture</u> ” Master degree diploma in “ <u>Aquatic Bioresources</u> ”
Bachelor and higher degree	Zaporozhzhia National University, Biology Faculty	Biology	Forest Biology, Game Management and Ichthyology	Bachelor Degree in “ <u>Biology</u> ”, specialization “ <u>Ichthyology and Aquaculture</u> ”
Coursers	Oles Honchar Dnipropetrovsk National University	Biology, Ecology, and Medicine	General Biology and Aquatic Bioresources	Courses of “ <u>General and Special Ichthyology</u> ”, “ <u>Pond and Industrial Aquaculture</u> ”, “ <u>Aquaculture</u> ”, “ <u>Ichthyopathology</u> ”, “ <u>Aquarium bio-design</u> ”
Coursers	Taras Shevchenko Kyiv National University	Educational and Scientific Center, Institute of Biology	, Zoology	Courses of “ <u>Fundamentals of Aquaculture</u> ”, “ <u>Ichthyology</u> ”, “ <u>Fisheries</u> ”;
Coursers	V.N. Karazin Kharkiv National University	Biology	Zoology and Animal Ecology	Courses of “ <u>Ichthyology</u> ” and “ <u>Industrial Aquaculture</u> ”;
Coursers	Yu. Fedkovych Chernivtsi National University	Institute of Biology, Chemistry, and Bioresources	Biochemistry and Biotechnologies	Course of “ <u>Intensive Technologies in Aquaculture</u> ”.

Level	Name of institute	Faculty	Department	Name of courses, degrees and specialties
Specialized degrees	National University of Life and Environmental Sciences of Ukraine	Food Technologies and Quality Management of Agricultural Sector Products	Meat, Fish and Seafood Product Technologies	Master degree diploma in “ <u>Food Technologies</u> ”, specialization in “ <u>Technologies of Storage and Processing of Aquatic Bioresources</u> ”
Specialized degrees	Odesa National Academy of Food Technologies	Technologies of Food Products, Perfumes and Cosmetics, Expertise and Merchandizing	Meat, Fish and Seafood Technologies	Specialist and Master degree diplomas in “ <u>Food Technologies</u> ”, specialization in “ <u>Technologies of Storage and Processing of Aquatic Bioresources</u> ”
Postgraduate studies	Institute of Fisheries of the National Academy of Agrarian Sciences of Ukraine (Kyiv)			Candidate of Agricultural Sciences in the specialty 06.02.03 “ <u>Aquaculture</u> ” Candidate of Biological Sciences in the specialty 03.00.10 “ <u>Ichthyology</u> ”
Postgraduate studies	Kherson State Agrarian University			Candidate of Agricultural Sciences in the specialty 06.02.03 “ <u>Aquaculture</u> ” Candidate of Biological Sciences in the specialty 03.00.10 “ <u>Ichthyology</u> ”;
Postgraduate studies	Institute of Hydrobiology of the National Academy of Sciences of Ukraine (Kyiv)			Candidate of Biological Sciences in the specialty 03.00.10 “ <u>Ichthyology</u> ”.

Table A1-42: List of associations of commercial fishers and aquaculturists of Ukraine

1. **NGO "Association of Fisheries Enterprises of Ukraine" (NGO "AFEU")**, Address: Turgenivska str. 82-A, Kyiv, 04053, Head: Bogonis Anastasiya Viktorivna, Tel: +38-098-357-72-46, Email: anastasiia.s@ukr.net
2. **Association "Interregional North-Azov Fishery Union"**, Address: Donetskaya obl., Mariupol, Mitropolitiska str. 4, office 316, Head: Chernyshova Renata Frantsevna, Tel/Fax: 380 629 336171, Email: azov_rks@ukr.net
3. **Zaporizhzhе public regional association "Priazovie"**, Address: Zaporizhzhе obl., Berdyansk, Shaumiana str. 2. Ukraine 71114, Head: Cherepovskiy Volodymyr Petrovych, Tel: 38 06153 22070, Email: pocherk07@gmail.com
4. **Association of producers and exporters of hydrobionts "Aqua-Zoo"**, Address: Khersonska obl., Henichesk, 12 Pivnichna, 7-A, Head: Kobluk Valeriy Vasylovych
5. **Fishery Association "Hajibeiski liman" (Black Sea Region)**, Address: Odessa obl., Kholodnaya balka, Vodoprovodnaya, 11, Head: Stepanenko Oleg Valentinovich, Tel: 38 0482 303431, Email: hadjiliman@ukr.net
6. **Danube Association of Fishery Companies**, Address: Odessa obl., Vilkovo, Belgorodsky Channel str., 107a, Head: Goncharov Grigoriy Kirillovich, Tel: 38 04843 32390, Email: assdanube@ukr.net
7. **Regional public union of fishing enterprises "BRIZ-2"**, Address: Odessa obl., Choromorsk distr., Burlacha Balka, Primorska str. 31, Ukraine 68094, Head: Matulyak Vasyly Vasylovych, Email: oovbr@yandex.ua