Market Prospects for Aquaculture Species

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Introduction

Objectives

This study was carried out by EUROFISH International Organisation, at the request of the Ministry of Rural Affairs of Estonia and the Ministry of Agriculture of Lithuania. The study has the objective to assess and report on the status and market prospects for aquaculture species in the EU, as a requirement of Article 46 of European Maritime and Fisheries Fund (EMFF) regulations. As requested, the study's species focus is on the following finfish and shellfish: Arctic char, barramundi, carp, European crayfish, European eel, European perch, European whitefish, freshwater shrimps, North African and Wels catfishes, pike-perch, rainbow trout, red claw crayfish, sturgeon, and tilapia.

The aim of the study is to provide information in the frame of recent global and EU production trends, trade patterns, and perspectives on local and international markets and marketing opportunities, to help strengthen the competitiveness of the EU freshwater aquaculture sector. Additional attention is paid in the report to trends in this sector in three Baltic Sea region countries, **Estonia, Latvia,** and **Lithuania**.

Methods

The report includes an overview of production and trade in the identified species in Europe and globally, and current trends in EU production and trends for these species in domestic markets. However, production is examined only in a market analysis context, not in terms of processes, technology, etc.

The analysis of the possibilities for future growth in EU freshwater fish and shellfish markets was undertaken with an evaluation of market and industry trends. This allows for identification of growing freshwater fish markets (and in some cases, declining ones), which is useful for anyone interested in entering or expanding their presence in such markets.

Using information from government, academic, business consulting and other sources, it was possible in this report to identify key issues facing producers and exporters in EU freshwater fish markets. Consideration of these issues helps industry actors understand their competitive strengths as well as areas that need added attention, to take advantage of opportunities in EU freshwater seafood markets. These issues, which are usually not easily quantifiable, include environmental and economic sustainability, food safety, and the EU regulatory structure governing both production and marketing, among others.

Statistics used in the analysis and published in the report originate from the Food and Agriculture Organisation of the UN http://www.fao.org/fishery/en (Globefish and the FishstatPlus database), the Federation of European Aquaculture Producers http://www.feap.info/default.asp, the European Market Observatory for Fisheries and Aquaculture Products http://www.eumofa.eu/ and the European Commission's Eurostat database http://ec.europa.eu/eurostat. Additional information sources represent the statistics offices of extra-EU national governments, industry periodicals and reports, and communications from private industry officials.

PART 1: The global market for aquaculture species

Production overview

The world's population is projected to reach 9 billion people by 2050, nearly 30 percent above the 2017 level of about 7 billion people.[1] Aquaculture is often suggested as the principal means by which the nutritional needs of this growing population are going to be met.[2] World output of farmed fish more than doubled between 2000 and 2014, to 73.8 thousand tonnes.[3] This growth is reflected in the number of people employed in world aquaculture: a total of 18,7 million in 2014, an increase of nearly 50 percent over 2000 employment of 12,6 million persons.

In Europe, aquaculture is also a "growth industry," with production of all species rising from 2.05 thousand tonnes in 2000 to 2.93 thousand tonnes in 2014, an increase of 43 percent. Most of this production is consumed within European borders, but a significant share (depending on the species) is exported around the world, including to rapidly growing populations in developing countries.

European production of farmed marine species (finfish, shellfish, and plants) has grown rapidly in the last several years, reaching a record 2,93 million tonnes in 2014 (the latest year for which totals are available). As a share of world output, however, Europe's importance has declined, due to the tremendous growth in production elsewhere, particularly in China.

Table 1. European aquaculture production: Quantity and percentage of world production

		2000	2005	2010	2012	2014
Eastern Europe	(1.000 tonnes)	195,9	239,0	251,3	278,6	304,3
	(%)	0,6	0,5	0,4	0,4	0,4
Norway	(1.000 tonnes)	491,3	661,9	1.019,8	1.321,5	1.332,5
	(%)	1,5	1,5	1,7	2,0	1,8
Northern Europe, excluding Norway	(1.000 tonnes)	309,0	327,6	363,5	391,3	402,8
	(%)	1,0	0,7	0,6	0,6	0,6
Southern Europe	(1.000 tonnes)	640,8	541,5	573,5	579,3	595,2
	(%)	1,3	0,8	0,6	0,4	0,4
Western Europe	(1.000 tonnes)	413,7	365,0	336,0	282,0	295,3
	(%)	1,3	0,8	0,6	0,4	0,4
Total Europe	**(1.000 tonnes)**	**2.050,7**	**2.134,9**	**2.544,2**	**2.852,3**	**2.930,1**
	(%)	**6,3**	**4,8**	**4,3**	**4,3**	**4,0**

Source: *FAO, The State of World Fisheries and Aquaculture 2016, http://www.fao.org/3/a-i5555e.pdf*

[1] UN Department of Economic and Social Affairs, https://www.un.org/development/desa/en/news/population/world-population-prospects-2017.html.

[2] Nikki Holmyard, "Aquaculture can feed the world," 31 August 2017. https://www.seafoodsource.com/commentary/aquaculture-can-feed-the-world-new-report-claims.
Alec Rosenberg, "Can farmed fish feed the world sustainably?," 13 September 2016. https://www.universityofcalifornia.edu/news/can-farmed-fish-feed-world-sustainably.
FAO, "Report highlights growing role of fish in feeding the world," http://www.fao.org/news/story/en/item/231522/icode/.

[3] FAO, *The State of World's Fisheries and Aquaculture 2016*. http://www.fao.org/publications/sofia/en/.

Table 2. European aquaculture production, by main species groups and areas in 2014				
	Inland	Marine and coastal	Total	Percentage of species group
	----------(tonnes)----------			(%)
Finfish	477.051	1.820.109	2.297.160	78,40%
Molluscs	n/a	631.789	631.789	21,56%
Crustaceans	74	241	315	0,01%
Other animals	39	824	863	0,03%
Total Europe	**477.164**	**2.452.963**	**2.930.127**	**100%**
Percentage of area	16,3%	83,7%	100%	

Source: *FAO, The State of World Fisheries and Aquaculture 2016 (http://www.fao.org/3/a-i5555e.pdf)*

The European aquaculture sector produces a large array of different species from a variety of production systems and degrees of farming intensification. Most of the EU aquaculture sector consists of small-scale farms, usually family owned and using extensive rearing methods which are not capital intensive and which provide ecosystem services as external benefits. However, a large share of output is produced by a relative handful of large, vertically integrated firms, some with operations in multiple countries, using advanced technology. As an indication of the high technology and capital-intensive nature of much of European aquaculture, fewer workers have been required to produce more farmed fish: total employment in this sector declined from 103 million in 2000 to 66 million in 2014 – a change in the opposite direction from world employment in this sector.

Trade overview

Both imports and exports by EU Member States of the selected species examined in this study and for which trade statistics was available – carp, catfish, crayfish, European eel, sturgeon roe, tilapia, rainbow trout and Arctic char – increased modestly in value during 2012-2015; imports grew by 8,4 percent and exports grew by 2,6 percent during the three-year period. In terms of volume, however, EU imports fell by 5,9 percent and exports remained almost unchanged, despite a drop during 2013-2014. Among other facts is that on average, unit values (prices) of EU-traded quaculture fish are increasing.

Table 3. Selected aquaculture species: EU imports and exports						
	Partners	2012	2013	2014	2015	2012-2015
Import Value (€ 1.000)	Intra-EU	439.354	494.544	520.241	556.686	26,7%
	Extra-EU	436.588	399.874	382.082	393.012	-10,0%
	Total	**875.942**	**894.418**	**902.323**	**949.698**	8,4%
Import Volume (tonnes)	Intra-EU	98.475	109.567	108.526	118.362	20,2%
	Extra-EU	189.005	188.543	171.633	152.238	-19,5%
	Total	**287.480**	**298.110**	**280.159**	**270.601**	-5,9%
Export Value (€ 1.000)	Intra-EU	489.837	481.520	490.817	515.094	5,2%
	Extra-EU	70.053	71.183	66.567	59.397	-15,2%
	Total	**559.890**	**552.703**	**557.384**	**574.491**	2,6%
Export Volume (tonnes)	Intra-EU	109.619	102.519	108.113	114.964	4,9%
	Extra-EU	12.936	12.199	9.532	7.804	-39,7%
	Total	**122.057,3**	**114.092,3**	**116.927,0**	**122.119,4**	0,1%

Source: *Eurostat*

The trading partners of EU importers and exporters changed significantly during 2012-2015. Both imports and exports, in both value and volume terms, shifted to Intra-EU trade and away from Extra-EU trade. That is, more of EU Member States' imports came from, and more exports were shipped to, other EU Member States at the expense of other trading partners around the world. There were differences on a species by species case, of course, but as a whole, EU trade in aquaculture fish products is becoming increasingly EU-focused.

Out of total **EU exports** to the world, the share in value terms that was shipped to Estonia, Latvia and Lithuania grew steadily from 3,1 percent in 2012 to 4,5 percent in 2015. During the same period, the Baltic share by volume grew from 4,8 percent to 5,4 percent of total world purchases of EU export supply.

Table 4. Selected aquaculture species: Baltic country imports from the EU *

	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Estonia	8.771	12.186	17.225	18.356	109,3%
Latvia	**3.488**	**4.902**	**4.254**	**4.932**	41,4%
Lithuania	4.896	5.137	2.627	2.713	-44,6%
Subtotal	17.155	22.224	24.106	26.001	51,6%
EU exports	**559.890**	**552.703**	**557.384**	**574.491**	**2,6%**
Baltic imports as a share of all EU exports	**3,1%**	**4,0%**	**4,3%**	**4,5%**	
	----------Volume in tonnes----------				
Estonia	2.786	3.107	3.874	4.455	59,9%
Latvia	1.326	1.457	1.221	1.378	3,9%
Lithuania	1.738	1.478	788	775	-55,4%
Subtotal	5.850	6.043	5.883	6.608	13,0%
EU exports	**122.057**	**114.092**	**116.927**	**122.119**	**0,1%**
Baltic imports as a share of all EU exports	**4,8%**	**5,3%**	**5,0%**	**5,4%**	

* Species groups include carp, catfish, crayfish, eels, sturgeon roe, tilapia and trout (the species for which trade statistics are available)

Source: *Eurostat*

Significant differences appeared among the three countries. Estonian imports of the selected farmed species from the EU grew by 109.3% in value and 59.9% in volume, to 4.500 tonnes, valued at € 18,4 million by 2015. In contrast, Lithuanian imports of selected farmed species from the EU fell by 44.6% in value and 55.4% in volume, to 775.200 tonnes, valued at € 2,7 million by 2015. Latvian imports of selected aquaculture species followed an upward trend, increasing by 41.4% in value and 3.9% in volume, to 1.378 tonnes, valued at € 4,9 million in 2015.

Exports by Estonia, Latvia and Lithuania of the farmed fish species examined in this study followed a similar trend to their imports. Out of total **EU imports** from the world, the share in value terms that originated from farmed fish exporters in Estonia, Latvia and Lithuania grew steadily from 1,2 percent in 2012 to 1,6 percent in 2015. In that same period, Baltic exporters' share of the EU market measured by volume grew slightly from 0.9 percent to 1,0 percent. These shares differed and depended on particular selected species.

Table 5. Selected aquaculture species groups: Baltic country exports to EU markets *					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Estonia	4.907	4.844	8.179	9.940	102,5%
Latvia	1.941	2.815	1.858	1.915	-1,4%
Lithuania	3.632	4.175	3.009	3.155	-13,1%
Subtotal	10.480	11.834	13.046	15.010	43,2%
EU imports	**875.942**	**894.418**	**902.323**	**949.698**	**8,4%**
Baltic exports as a share of all EU imports	**1,2%**	**1,3%**	**1,4%**	**1,6%**	
	----------Volume in tonnes----------				
Estonia	809	633	934	1.185	46,6%
Latvia	669	809	483	563	-15,9%
Lithuania	1.159	1.402	1.094	1.036	-10,6%
Subtotal	2.636	2.844	2.511	2.784	5,6%
EU imports	**287.480**	**298.110**	**280.159**	**270.601**	**-5,9%**
Baltic exports as a share of all EU imports	**0,9%**	**1,0%**	**0,9%**	**1,0%**	

* Species groups include carp, catfish, crayfish, eels, sturgeon roe, tilapia and trout (the species for which trade statistics are available)

Source: *Eurostat*

Varying trends were observed among the three Baltic countries. Total Estonian exports of the selected farmed species to other EU Member States grew by 102,5% in value and 46,6% in volume, reaching almost 1.200 tonnes, valued at € 9,9 million in 2015. In contrast, Lithuanian exports of selected farmed species to other EU Member States fell by 13,1% in value and 10,6% in volume, down to 1.000 tonnes, valued at € 3,2 million in 2015. As with Lithuania, Latvian exports of the selected aquaculture followed a downward trend, keeping an almost stable value (-1,4%) and declining in volume by 15,9%, to 563 tonnes, valued at € 1,9 million in 2015.

PART 2: Selected species

Arctic char *(Salvelinus alpinus)*

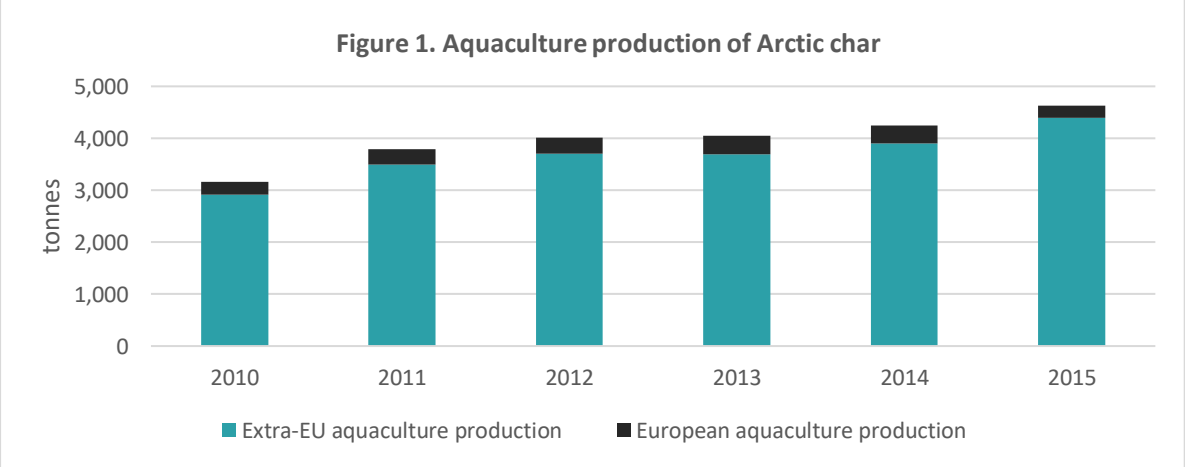
Introduction

Arctic char (*Salvelinus alpinus*) is a salmonid closely related to Atlantic salmon and brown trout, and is the northernmost freshwater fish in the world. It has been farmed for well over a decade, and nearly all Arctic char available on the market is farm-raised. Arctic char is well adapted to cold environments and has therefore been considered as a good choice for farming in countries with colder climatic conditions.

Production

In 2015, the total global farmed production of Arctic char reached 4.630 tonnes, after several years of uninterrupted growth. Nearly 85% came from Iceland, and the remainder from Norway, Canada, and the USA. Icelandic production of Arctic char increased from about 500 tonnes in 1995 to 4.400 tonnes in 2015, a nearly 10-fold increase in two decades. Continued growth of the Icelandic production is projected at 10% per year until 2020, targeting 7.000 tonnes[4].

The first practices of Arctic char farming in Iceland started in 1910, and production on an industrial scale did not emerge until 1987. In 1992, the Icelandic government initiated an Arctic char genetic improvement programme, and since then production doubled within five years after the implementation of the programme[5]. At present, the Icelandic Arctic char farming sector consists of approximately 15 farms.



Source: *FishstatPLUS, FAO*

[4] "Aquaculture of Arctic Char in Iceland", by Helgi Thorarensen, Holar University of Iceland.
[5] "Arctic char fish farming in Iceland", by Asgeir Heimisson, Institute of Economic Studies, University of Iceland

According to Eurostat, the EU production fell from a peak of 358 tonnes in 2013 to 233 tonnes in 2015. Austria was the largest producer of Arctic char with over 200 tonnes in 2015, followed by Italy (15 tonnes) and the UK (10 tonnes). Farming of Arctic char has started as a relatively new activity in Latvia, where the species is produced in both ponds and basins. In 2014, production of Arctic char in Latvia reached about 400 kg.

Table 6: EU and Extra-EU aquaculture production of Arctic char (tonnes)

	2010	2011	2012	2013	2014	2015
EU countries:						
Austria	45	140	120	142	328	208
Italy	138	99	148	165	16	15
UK	14	13	11	11	10	10
Other countries	40	40	40	40	0	0
Subtotal	**237**	**292**	**319**	**358**	**354**	**233**
Extra-EU countries:						
Iceland	2.427	3.021	3.089	3.215	3.411	3.937
Norway	492	276	309	281	285	259
Canada	200	200	200	200	200	200
Other countries	0	0	100	0	0	0
Subtotal	**3.119**	**3.497**	**3.698**	**3.696**	**3.896**	**4.396**
Total	**3.356**	**3.789**	**4.017**	**4.054**	**4.250**	**4.629**

Source: *FishstatPLUS, FAO*

According to the Federation of European Aquaculture Producers (FEAP[6]), which provide statistics from its members (i.e, national aquaculture associations), the global production of Arctic char grew steadily to a record 6.032 tonnes in 2015, driven by Iceland's growth. By that source, Sweden is the world's second largest producer and the EU's largest producer with nearly 1.650 tonnes of Arctic char produced in 2015.

Table 7. Arctic char production (tonnes)

	2010	2011	2012	2013	2014	2015
Iceland	2.427	3.021	3.089	3.215	3.411	3.937
Sweden	1.307	1.128	1 849	1.808	1.644	1.644
Norway	450	450	300	300	300	300
Austria	45	45	120	141	151	151
Total	**4.229**	**4.644**	**5.358**	**5.464**	**5.506**	**6.032**

Source: *FEAP*

Analyzing production techniques and expansion of Arctic char farming, the reports from the industry indicate that Arctic char farmers have had considerable difficulty selecting char that consistently perform well because of its complex genetics, which is one reason that supply of Arctic char remains limited[7]. In addition, aquaculture of Arctic char has faced some problems, such as temporary disease

[6] The United Voice of the European Aquaculture Production Industry, Facts & Figures: Production (*http://www.feap.info/Default.asp?SHORTCUT=573*), *p. 33.*

[7] http://www.feednavigator.com/Markets/Arctic-Char-can-be-a-sustainable-alternative-to-salmon-investors

problems (e.g., bacterial kidney disease (BKD) in Iceland).[8] Low egg survivability and "precocious maturation" are other reported problems contributing to marginal profitability in some countries.[9] Nevertheless, the large increase of Arctic char production is a significant indicator that the production operations and the overall industry has been profitable.

The supply of Arctic char from the wild is much lower than from aquaculture and is provided from inland fisheries outside of the EU (50 tonnes, mostly from Switzerland), European inland fisheries (25 tonnes, mostly from Sweden and France) and Extra-EU marine fisheries (40 tonnes from Greenland).

Trade

Arctic char is traded internationally as whole/round (gutted with the head on) or as fully trimmed fillets, suited for further processing, fresh or frozen. In terms of color, farmed char has redder skin than wild char (more silver skinned) and cream-colored spots, however arctic char farmers add a synthetic pigment to the feed to give the fish a consistent pink-orange color. The high fat content in Arctic char makes it well-suited for dry-heat cooking such as broiling and smoking[10].

In international trade statistics, Arctic char is grouped together with other salmonid species, therefore, the trade of the species separately is not available. In the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members), Arctic char is provided for several subheadings under CN headings 0302, 0303, 0304, and 1604.

EU Combined Nomenclature: Provisions for Arctic char

0302, 0303	Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all salmonidae except trout, Pacific salmon, Atlantic salmon, and Danube salmon*):
0302 19 00	Fresh or chilled fish, excluding fillets and other fish meat, Other
0303 14 90	Frozen fish, excluding fillets and other fish meat, Other
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all salmonidae except trout, Pacific salmon, Atlantic salmon, and Danube salmon*):
0304 49 90	Fresh or chilled fillets and other fish meat, Other
0304 89 90	Frozen fillets and other fish meat, Other
0305	Smoked fish, including fillets
0305 49 80	Smoked, Other (*Note: includes all fish except trout, salmon, tilapias, cod and related species, flatfish, eels and mackerel*)
1604	Fish, prepared or preserved, including in airtight containers
1604 19 10	Salmonidae, other than salmon (*Note: includes trout*)

Iceland is the largest exporter of Arctic char in the world. According to information from the industry sources, most of the Iceland Arctic char is exported by air to several countries in Europe and North America. In 2014, Iceland exported about 2.600 tonnes of Arctic char products, of which 60% was exported as whole fresh Arctic char, about 20% as fresh fillets and the rest as whole frozen and frozen fillets. Following the growth in production, Icelandic exports of Arctic char doubled in the period 2007-2014, and exports of whole fresh Arctic char increased most.

[8] http://www.aquaculturemag.com/magazine/june-july-2015/2015/08/18/farming-of-arctic-charr-still-represents-a-small-part-of-global-salmonid-aquaculture

[9] *International Workshop: Arctic Char Aquaculture 2011: Assessing Status – Identifying Opportunity*, Final report, Aquaculture Collaborative Research and Development Program of Fisheries and Oceans Canada, 30 June 2011. http://www.irzc.umcs.ca/flash_content/Dossier%20PDF/Publications/ACRDP_Final_Report.pdf.

[10] http://www.fisheries.is/aquaculture/species/arctic-charr/

Table 8. Iceland exports of Arctic char and rainbow trout						
	2012	2013	2014	2015	2016	2012-2016
Volume (tonnes)	2.006	2.355	2.814	3.306	3.602	79,6%
Value (€ 1.000)	12.621	14.706	17.720	23.513	25.679	103,5%
Unit value (euro/kg)	6,29	6,24	6,30	7,11	7,13	13,3%

Source: *Statistics Iceland, http://www.statice.is/statistics/business-sectors/fisheries/*

In 2016, Iceland exported 3.602 tonnes of Arctic char and trout together (both species are combined in official trade statistics), at a value of €25,7 million, up from 2.006 tonnes, valued at €12,6 million in 2012. This growth is primarily due to rising char exports.[11] During this period, the unit value of such exports, measured in euros, rose almost steadily from 6,29 €/kg in 2012 to 7,13 €/kg in 2016. On average during 2012-2016, about 50 percent of Iceland's exports were destinated for EU markets, 13 percent to other European markets, and about 36 percent to North America. Only one percent of these exports were shipped elsewhere.

Market

Most of the Icelandic Arctic char is exported, mainly to the **United States,** however, the **UK** and **Germany** are becoming increasingly important markets. The United States is the main market for fresh whole Arctic char (610 tonnes) and fresh fillets (250 tonnes), absorbing nearly half of the Icelandic exports of fresh whole Arctic char and one third of fresh fillets in 2014. The UK is the second largest market for fresh Arctic char (600 tonnes), while Germany is the second largest market for fresh fillets (156 tonnes). In the category of frozen Arctic char, Germany is the largest market (123 tonnes), followed by **Sweden** (72 tonnes). Icelandic enterprises also export some quantities of smoked Arctic char (300 kg) mainly to Switzerland (150 kg) and the Netherlands (50 kg)[12].

A large percentage of the exported Arctic char is purchased by wholesalers and distributed to restaurants as fresh fish (whole and fillets). Most of the frozen product is distributed to supermarkets or cruise ships.

Arctic char is regarded as a **premium product**. Historically, there has been a limited supply and market acknowledgement, which restricts marketing and distribution of Arctic char products and adds to its premium price [13]. Therefore, marketing and financing are considered as the major limitations from the view of Icelandic enterprises.

On the global market, Arctic char faces competition with related species of salmon and trout, which are far more known than Arctic char. However, Arctic char falls into the **niche category** and is better known in the Ho-Re-Ca sector, especially in premium restaurants, than in the households. Restaurant chefs and other buyers consider the species as a good substitute for farm-raised salmon because it has a more delicate texture, mild flavour and pink-orange colour.

[11] ISB Research (Islandsbanki), Icelandic Seafood Market Report , Nov. 2016, available at https://www.islandsbanki.is/library/Skrar/Seafood-Reports/Islenski-Sjavarutvegurinn-ENSKA2016-LQ.PDF.

[12] Arctic char fish farming in Iceland", by Asgeir Heimisson, Institute of Economic Studies, University of Iceland

[13] *International Workshop: Arctic Char Aquaculture 2011: Assessing Status – Identifying Opportunity*, Final report, Aquaculture Collaborative Research and Development Program of Fisheries and Oceans Canada, 30 June 2011. http://www.irzc.umcs.ca/flash_content/Dossier%20PDF/Publications/ACRDP_Final_Report.pdf.

According to industry sources, the export price of fresh whole Arctic char from Iceland in 2016 reached 7,2 USD/kg, while the retail price was between 32 and 44 USD/kg. The export price of fresh Arctic char fillets was 12,1 USD/kg, while the retail price was 44 USD/kg. The export price of frozen Arctic char was 10,2 USD/kg, and the export price of smoked Arctic char was 29 USD/kg[14].

The retail prices for Arctic char in Denmark start with DKK 299 (€ 40.8) per kg for frozen fillets of farmed Icelandic Arctic char. The size of the fillets range from 150 -300 g per piece, and the package is sold as 2.5 kg for DKK 747.5 (€ 100)[15]. The retail price for Arctic char in the UK range from GBP 11.20 for a 320g tail piece (€ 12.4 per 320 g) to GBP 14.00 (€ 15.80) for a 280g fillet steaks and GBP 37.80 (€ 42.65) for 840g fillet steaks[16].

Picture 1: Arctic char products in the EU fishmonger stores (from left to right: the UK and Denmark)

Source: *The fish Society (UK) and Butik Fiskebilen (Denmark)*

Table 9. Arctic char: Selected retail on-line prices in the UK

Product	Size	Price	Price/kg	Price/kg (euros)
2xS Arctic Char 99% boneless	260g	£13,00	£50,00	€ 56,19
2xM Arctic Char 99% boneless	280g	£14,00	£50,00	€ 56,19
1x Arctic Char tailpiece 2M	320g	£11,20	£35,00	€ 39,33
1x Arctic Char tailpiece 2M	340g	£11,90	£35,00	€ 39,33
6xM Arctic Char	840g	£37,80	£45,00	€ 50,57

Source: *https://www.thefishsociety.co.uk/shop/Arctic-char.html. Prices as of 27/10/2017*

A comparison of Arctic char prices in various retail stores in the main European markets showed that, in the few markets where char was observed on sale, retail prices differed by method of preservation.[17] Fresh char in Belgium, for example, was priced at € 29,95, while frozen char in Latvia was priced at €14,29. Smoked char sold in Austria was priced at € 47,90.

[14] "Arctic char fish farming in Iceland", by Asgeir Heimisson, Institute of Economic Studies, University of Iceland

[15] https://butik.fiskebilen.dk/fisk/fjeldorred-da21007 (per October 2017)

[16] https://www.thefishsociety.co.uk/shop/Arctic-char.html (per October 2017)

[17] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

Barramundi *(Lates calcarifer)*

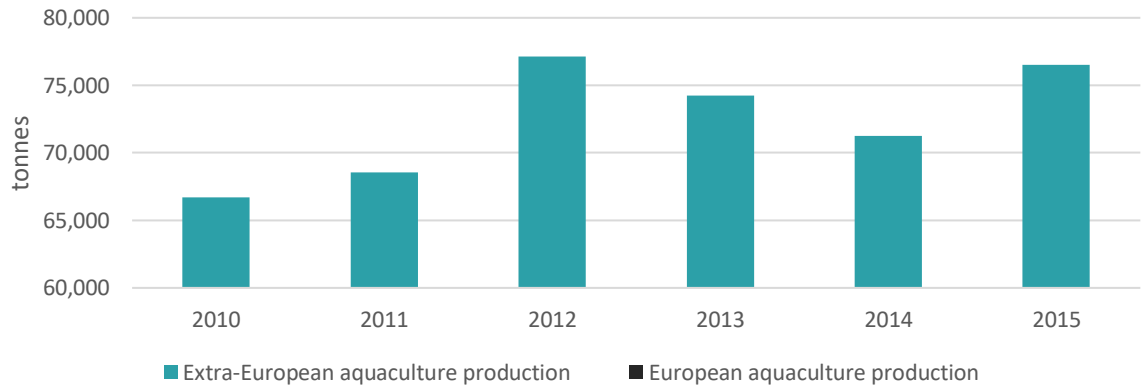
Introduction

Barramundi, also known as Asian sea bass and Australian sea bass, has long been regarded as a premier foodfish in its native waters, from northern Australia up to Southeast Asia and west to the coasts of India and Sri Lanka. Because of its mild, buttery flavor, meaty texture and cooking versatility, it is part of a culinary trend in Europe and North America.

Production

Farmed barramundi is reported to be a cost-effective and sustainable alternative to grouper, snapper, and halibut with continuous availability from large aquaculture producing enterprises in Southeast Asia, including **Malaysia, Thailand, Taiwan, Vietnam** and other countries. The species is produced in small coastal cage farms, and often these farms culture a mixture of species, including barramundi, groupers and snappers. In addition to aquaculture production around the world, some 350 tonnes of barramundi are supplied from the wild from **Papua New Guinea**. Virtually no barramundi is commercially produced in Europe.

Figure 2: Aquaculture production of barramundi



Source: *FishstatPLUS, FAO*

Table 10. Barramundi: Extra-European aquaculture production (tonnes)

	2010	2011	2012	2013	2014	2015
Total	**66.687**	**68.558**	**77.138**	**74.251**	**71.267**	**76.498**
Malaysia	20.022	17.607	20.125	17.005	30.446	29.133
Thailand	13.434	16.157	19.317	16.761	16.502	16.905
Taiwan	22.633	24.066	26.148	28.803	11.582	14.015
Other	10.598	10.728	11.548	11.682	12.737	16.445

Source: *Fishstat, FAO*

After three decades of nearly exponential growth, global aquaculture production of barramundi entered an apparent phase of "market maturity" after 2012. Production dipped in 2013-2014 and recovered to nearly its previous record, with 76.500 tonnes produced in 2015.

Malaysia is the largest farming country of barramundi with over 29.000 tonnes of the production volume in 2015, followed by Thailand (16.900 tonnes) and Taiwan (14.000 tonnes). Where barramundi farming is carried out outside the tropics, recirculation production systems are often used (e.g. in southern Australia and in the northeastern USA).

Barramundi has been introduced for aquaculture purposes to Iran, Guam, French Polynesia, the USA (Hawaii and Massachusetts) and Israel. In Europe, production of barramundi is carried out on the trial level, mainly in the UK farms,[18] and has shown early success in Poland.[19] [20]

Trade

International trade of barramundi is not reported in official statistics separately, but grouped with other species in the EU Combined Nomenclature of the Common Customs Tariff Schedule under the headings 0302, 0303, and 0304.

There is relatively little import and export of barramundi – most production is consumed locally. One exception is the culture of barramundi in recirculation production systems in the USA, with fingerlings exported by air from Australia. [21]

EU Combined Nomenclature: Provisions for barramudi

0302, 0303	Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all fish except Salmonidae, flatfish, tunas, herrings, anchovies, sardines, mackerel, jack and horse mackerel, cobia, swordfish, cod and related species, hake, Alaska pollock, whiting, tilapias, catfish, carp, eels, sharks, rays and skates, toothfish, sea bass (Dicentrarchus spp.), sea bream, and freshwater fish*):
0302 85 90	Fresh or chilled fish, excluding fillets and other fish meat, Other
0303 89 90	Frozen fish, excluding fillets and other fish meat, Other
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all fish except salmonidae, flatfish, tunas, herrings, anchovies, sardines, mackerel, jack and horse mackerel, cobia, swordfish, cod and related species, hake, Alaska pollock, whiting, tilapias, catfish, carp, eels, sharks, rays and skates, toothfish, sea bass (Dicentrarchus spp.), sea bream, and freshwater fish*):
0304 49 90	Fresh or chilled fillets and other fish meat, Other
0304 89 90	Frozen fillets and other fish meat, Other

Market

Barramundi is considered as a well-known gourmet fish around the world. Widely prized for its sweet, mild taste and delicate texture, barramundi has been favorably compared to striped bass, grouper, and other premium whitefish. Barramundi is known as Akame in production of sushi. [22]

[18] Factsheet on *Lates calcarifer* (barramundi), Cultured Aquatic Species Information Programme, FAO (http://www.fao.org/fishery/culturedspecies/Lates_calcarifer/en).
[19] "Increased interest in development of land based aquaculture in Poland." Opportunities Abroad: An Innovation-Norway Blog (http://www.opportunities-abroad.no/2017/01/16/increased-interest-in-development-of-land-based-aquaculture-in-poland/).
[20] "Fish and Seafood Market in Poland." USDA Foreign Agricultural Service, Global Agricultural Information Network (GAIN) Report, 16 Sept 2015 (https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Fish%20and%20Seafood%20Market%20in%20Poland._Warsaw_Poland_9-16-2015.pdf)
[21] Factsheet on *Lates calcarifer* (barramundi), Cultured Aquatic Species Information Programme, FAO (http://www.fao.org/fishery/culturedspecies/Lates_calcarifer/en).
[22] Source: https://www.seafoodsource.com/seafood-handbook/finfish/barramundi

In Asia, most barramundi are marketed at 500–900 g, although small numbers of larger fish (1–3 kg) are also sold. In Australia, there are two main products from farmed barramundi: 'plate size' and fillet product. 'Plate size' fish range from 350–500 g, although larger (banquet) fish may be up to 800 g. Fillet product fish are generally in the range of 2 to 3 kg.

There has been little effort put into developing value-added products for barramundi. In Australia, there are a few suppliers of smoked barramundi. Throughout its cultured range, live barramundi are sold to restaurants that specialize in live seafood products, but this is a relatively small proportion of the total potential market for barramundi.

In most countries where it is farmed, there has been relatively little market development for barramundi. In Asia, barramundi is a relatively inexpensive product and most farmer interest is now on higher-value species, such as groupers.

Table 11. Barramundi: Sample retail on-line prices in the UK

Product	Size	Price	Price/kg	Price/kg (euros)
2xS B-mundi flt portions	240g	£10,10	£42,08	€47,11
2xS B-mundi flt portions	260g	£10,90	£41,92	€46,93
2xS B-mundi flt portions	280g	£11,70	£41,79	€46,79
2xM B-mundi flt portions	300g	£12,60	£42,00	€47,02
2xM B-mundi flt portions	320g	£13,40	£41,88	€46,89
2xM B-mundi flt portions	340g	£14,20	£41,76	€46,75
2xM B-mundi flt portions	360g	£15,10	£41,94	€46,95
SAVER PACKS				
6xS B-mundi flt portions	780g	£30,40	£38,97	€43,63
6xS B-mundi flt portions	840g	£32,00	£38,10	€42,65
6xM B-mundi flt portions	960g	£36,50	£38,02	€42,57
6xM B-mundi flt portions	1.020g	£38,60	£37,84	€42,36

***Source**: https://www.thefishsociety.co.uk/eating-experience/barramundi/barramundi-fillets.html (3Q 2017 price information)*

Retail prices for barramundi stay within a fairly tight band when measured on a per-kg basis. For example, on a large UK fishmonger's website, prices for various packs of barramundi fillets (11 products in all) fall within the range of €46,75-€47,11 per kg for small packs and €42,36-€43,63 per kg for large "saver packs".

Carp (*Cyprinus carpio, Ctenopharyngodon idella, Hypophthalmichthys molitrix*)

Common carp
(*Cyprinus carpio*)

Grass carp
(*Ctenopharyngodon idella*)

Silver carp
(Hypophthalmichthys molitrix)

Introduction

Carp are a freshwater fish of the family *Cyprinidae*, which includes a large number of species native to Asia and Europe. Three species, are of particular importance in aquaculture in Europe and globally: Common carp *(Cyprinus carpio)*, Grass carp *(Ctenopharyngodon Idella)*, and Silver carp *(Hypophthalmichthys molitrix)*. Common carp are by far the most important farmed carp species.

Carp is by far the dominant finfish variety produced by aquaculture. At present, two-thirds of total worldwide finfish supply provided by aquaculture activities belongs to the carp family, nearly 20 million tonnes.

Carp farming is an ancient form of food fish production, with origins dating back well over 2,000 years in China, where the fish were kept in ponds stocked regularly with fry from rivers. In Europe, carp has been reared since Roman times when carp were raised and kept in monoculture. Controlled semi-natural pond breeding and fry rearing of carp started in Europe in the 19th century[23].

Production

Table 12. Carps: World farmed production (1.000 tonnes)

	2010	2011	2012	2013	2014	2015
Extra-EU	11.809	12.217	12.889	13.719	14.587	15.197
EU	77	70	74	76	78	79
Total	**11.886**	**12.287**	**12.963**	**13.795**	**14.665**	**15.276**

Source: *FAO Fishstat*

World (extra-EU plus EU) production of farmed carp reached a record 15,3 million tonnes in 2015, an increase of about 30 percent from 5 years earlier. The vast majority of this production took place outside the EU, mainly in Asia. **China** dwarfs all other global producers in the production of all three major species, and is distantly followed by **Indonesia, India, Vietnam**, **Bangladesh** and **Iran**.

[23] http://www.fao.org/fishery/culturedspecies/Cyprinus_carpio/en

Table 13. Carps: Extra-European aquaculture production (1.000 tonnes)						
	2010	2011	2012	2013	2014	2015
Carp, common						
China	2.538	2.718	2.897	3.023	3.172	3.358
Indonesia	283	332	374	413	434	461
Viet Nam	56	78	88	97	104	94
Bangladesh	46	62	65	85	74	76
Other	429	243	260	281	305	267
Subtotal common carp	3.353	3.432	3.685	3.898	4.089	4.257
Carp, grass						
China	4.222	4.442	4.782	5.070	5.377	5.676
Bangladesh	27	21	18	37	45	39
Pakistan	24	24	24	25	25	25
Iran (Islamic Rep. of)	18	20	15	25	17	28
Other	62	67	69	78	71	78
Subtotal grass carp	4.360	4.658	5.016	5.226	5.536	5.821
Carp, silver						
China	3.608	3.714	3.688	3.851	4.226	4.355
India	130	103	123	301	320	343
Bangladesh	196	139	181	234	201	185
Iran (Islamic Rep. of)	67	73	85	92	85	101
Other	96	98	112	116	131	136
Subtotal silver carp	4.096	4.127	4.189	4.594	4.963	5.120
Total, all carps	**11.809**	**12.217**	**12.889**	**13.719**	**14.587**	**15.197**

Source: *Fishstat, FAO*

EU producers supply almost 80.000 tonnes of carp annually to European markets, with the main production concentrated in Central and Eastern Europe. The EU's biggest carp farming countries are the **Czech Republic** and **Poland**, followed by **Hungary**, **Germany** and **France**. These five countries are together responsible for almost 90% of total European carp output. In 2010-2015, farmed carp production increased by 7.5%, reaching 79.084 tonnes.

The Common carp (*Cyprinus carpio*) is Europe's most widely produced and consumed carp species. Farmed output of Common carp in Europe has been stable at around 70.000 t annually in the last few years, although there have been variations by country. **Poland** and the **Czech Republic**, the leading suppliers, both demonstrated generally rising production of this species, to about 18.000 tonnes each in 2015. **Hungary**, the third most important producing country, is in an intermediate position, with annual production relatively stable at 10.000 to 11.000 tonnes in the period 2010-2015. In contrast, there are downward trends for **Germany** and **France**.

Table 14. Carps: European aquaculture production (tonnes)						
	2010	2011	2012	2013	2014	2015
Carp, common						
Czech Republic	17.746	18.198	17.972	16.809	17.833	17.860
Poland	15.400	14.430	17.700	18.760	20.302	17.749
Hungary	9.927	10.807	9.985	9.632	10.291	10.725
Germany	9.634	5.082	5.521	5.699	5.285	4.916
France	4.200	4.200	4.200	4.200	4.000	4.000
Other	11.127	11.796	12.277	14.656	13.576	15.960
Subtotal common carp	68.034	64.513	67.655	69.756	71.287	71.210
Carp, grass						
Poland	579	522	390	269	326	593
Hungary	437	437	502	576	516	516
Czech Republic	488	412	456	384	337	445
Other	523	471	607	792	895	714
Subtotal grass carp	2.027	1.842	1.955	2.022	2.074	2.268
Carp, silver						
Hungary	1.081	1.545	1.681	1.624	1.434	2.169
Romania	2.016	1.323	2.087	2.031	1.900	1.843
Bulgaria	29	93	78	70	142	677
Poland	--	--	430	317	371	594
Other	114	200	292	245	351	863
Subtotal silver carp	3.475	3.260	4.685	4.369	4.210	5.606
Total all carps	**73.536**	**69.615**	**74.295**	**76.146**	**77.570**	**79.084**

***Source**: Fishstat, FAO.*

Carp is the major produced aquaculture species in **Latvia** and **Lithuania**, and is one of the farmed species in **Estonia**. In 2015, Latvian enterprises produced 544 tonnes of Common carp, and about 10 tonnes of Crucian carp. Nearly all carp is farmed extensively in ponds, except smaller volumes reared in basins. Latvian production of farmed carp has been stable during the past decade, however, production figures in 2016 indicated a solid increase doubling production up to 1.065 tonnes due to increased production capacity. The Lithuanian farming of Common carp has been on the rise in the past years increasing nearly 30% from 2.832 tonnes in 2008 to 3.667 tonnes in 2015. Moreover, the country also produced about 100 tonnes of bighead carp, 97 tonnes of grass carp and 30 tonnes of Crucian carp in 2015, significantly increasing production volumes for all species. Production of carp species in Estonia has been on the level of 40-50 tonnes in the past ten years, however, production figures for 2015 are not currently available.

While farming is the chief method of carp production, there still are sizeable capture fisheries for carp. The supply of the major carp species from inland fisheries includes approximately 194.000 tonnes from Extra-EU countries (mainly Mexico, Iran, Iraq, and Egypt) and 12.500 tonnes from Europe. The largest EU suppliers of carp from wild fisheries are **Hungary**, the **Czech Republic**, and **Slovakia**.

Table 15. Carps: Extra-European inland fisheries production (tonnes)						
	2010	2011	2012	2013	2014	2015
Carp, common:						
Mexico	29.793	22.881	22.186	29.456	31.350	35.779
Iran (Islamic Rep. of)	8.775	10.665	11.862	12.754	14.466	15.520
Iraq	n/a	11.053	13.500	37.500	45.576	15.397
Other	36.581	37.541	39.396	38.969	40.589	39.650
Subtotal	**75.149**	**82.140**	**86.944**	**118.679**	**131.981**	**106.346**
Carp, grass:						
Egypt	21.354	32.160	15.094	16.886	15.416	15.371
Iran (Islamic Rep. of)	3.134	3.809	4.236	4.555	5.167	5.543
Uzbekistan	600	735	937	783	1.256	2.234
Other	223	250	161	230	574	270
Subtotal	**25.311**	**36.954**	**20.428**	**22.454**	**22.413**	**23.418**
Carp, silver:						
Iran (Islamic Rep. of)	10.342	12.569	13.980	15.032	17.050	18.292
Ukraine	244	388	399	404	4.705	4.689
Uzbekistan	300	1.167	1.577	2.252	2.018	3.156
Other	782	1.076	874	1.271	2.631	1.565
Subtotal	**11.688**	**15.200**	**16.830**	**18.959**	**26.404**	**27.702**
TOTAL	**112.128**	**134.294**	**124.202**	**160.092**	**180.798**	**157.466**

Source: *Fishstat, FAO.*

Table 16. Carps: European inland fisheries production (tonnes)						
	2010	2011	2012	2013	2014	2015
Carp, common						
Hungary	3.247	3.855	3.688	3.390	5.602	7.307
Czech Republic	3.161	2.997	3.207	2.917	2.955	3.014
Slovakia	1.159	1.433	1.419	1.463	1.434	1.466
Other	1.206	1.338	1.341	737	752	774
Subtotal	**8.773**	**9.623**	**9.655**	**8.507**	**10.743**	**12.561**
Carp, grass						
Hungary	338	356	376	280	142	309
Czech Republic	89	111	91	93	101	94
Slovakia	35	61	63	67	58	64
Other	89	86	95	73	82	82
Subtotal	**551**	**614**	**625**	**513**	**383**	**549**
Carp, silver						
Romania	74	62	88	110	133	151
Poland	66	40	30	27	28	30
Germany	10	1	20	42	25	18
Hungary	350	455	336	370	n/a	n/a
Other	64	34	46	15	21	23
Subtotal	**564**	**592**	**520**	**564**	**207**	**222**
Total	**9.888**	**10.829**	**10.800**	**9.584**	**11.333**	**13.332**

Source*: Fishstat, FAO.*

Trade

In international trade statistics, carp species are grouped together. In the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members), carp are provided for under CN headings 0302, 0303, and 0304.

In 2012-2015, EU carp imports carp (all forms) grew by 23 percent in value, from € 21,2 million to € 26,1 million, and by 20 percent in volume, from 10.8 thousand tonnes to 12,9 thousand tonnes. By far the bulk of EU carp imports is made up by live fish, which grew 4 percent in value and 15 percent in quantity during 2012-2015.

EU Combined Nomenclature: Provisions for carp

0301	Fish, live:
0301 93 00	Of the species *Cyprinus* spp., *Carassius* spp., *Ctenopharyngodon idellus*, *Hypophthalmichthys* spp., *Cirrhinus* spp., *Mylopharyngodon piceus*, *Catla catla*, *Labeo* spp., *Osteochilus hasselti*, *Leptobarbus hoeveni*, *Megalobrama* spp.
0302, 0303	Fish, excluding fillets and other fish meat:
0302 73 00	Carp, fresh or chilled
0303 25 00	Carp, frozen
0304	Fish fillets and other meat, fresh, chilled or frozen (*Note: also includes eels and snakeheads*):
0304 39 00	Fresh or chilled
0304 69 00	Frozen

Table 17. Carp: EU imports, by product form

		2012	2013	2014	2015	2012-2015
Value in € 1.000	Live	17.777	16.631	16.596	18.469	4%
	Fresh/chilled	2.180	1.923	1.506	2.448	12%
	Frozen	1.272	1.543	3.556	5.206	309%
	Total	**21.229**	**20.098**	**21.658**	**26.122**	**23%**
Volume in tonnes	Live	8.972	8.655	8.721	10.286	15%
	Fresh/chilled	1.024	858	679	1.042	2%
	Frozen	769	901	1.191	1.582	106%
	Total	**10.764**	**10.414**	**10.591**	**12.910**	**20%**

Source: *Eurostat.*

Table 18. Carp: EU exports, by product form

		2012	2013	2014	2015	2012-2015
Value in € 1.000	Live	24.886	25.269	24.415	31.479	26%
	Fresh/chilled	1.860	1.619	1.249	2.254	21%
	Frozen	969	1.263	1.174	798	-18%
	Total	**27.715**	**28.151**	**26.837**	**34.532**	**25%**
Volume in tonnes	Live	11.501	11.506	11.367	15.954	39%
	Fresh/chilled	553	420	365	656	19%
	Frozen	499	628	719	649	30%
	Total	**12.553**	**12.554**	**12.450**	**17.259**	**37%**

Source: *Eurostat.*

During the same period, carp exports by EU Member States (to all destinations) grew by € 6,8 million (25%) in value and by 4.706 tonnes (37%) in volume. This increase was led mainly by exports of live carp, which grew by 26% in value and 39% in quantity during 2012-2015.

Table 19. Carp: Major exporters to EU Member States					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Czech Republic	12.125	11.747	11.674	9.647	-20,4%
Lithuania	1.182	1.124	917	909	-23,1%
Bulgaria	750	674	416	510	-32,0%
Poland	940	687	464	513	-45,4%
France	92	230	172	76	-17,1%
Subtotal	15.090	14.462	13.643	11.656	-22,8%
Total	**21.229**	**20.098**	**21.658**	**26.123**	**23,1%**
Subtotal share	71,1%	72,0%	63,0%	44,6%	

Source: *Eurostat*

The largest EU exporters of carp include the **Czech Republic**, **Lithuania**, **Bulgaria**, **Poland** and **France**. Together these exporters supplied 44,6 percent of total EU imports in 2015, down from 71,1 percent in 2012. All such exporters experienced large declines in their trade during 2012-2015.

Most EU carp imports as well as exports are traded between the EU Member States. Eighty percent or more of carp imports by EU Member States come mostly from other EU countries, with the remainder imported mainly from Asian countries (**Thailand**, **Myanmar** and others). Likewise, most exports from EU countries are destined for markets in other EU countries. In 2015, intra-EU trade accounted for 80% of total imports by Member States and 97% of total exports.

Market

The EU carp market can be characterized as well-established, mature, with signs of some dynamism. Even though the "flagship" product of Europe's carp industry – **live fish** – has been unchanged for centuries, there are plenty of traditional consumers and a ready supply in the market thanks to a growing aquaculture industry during the last few decades. The dynamism in the market is observed in new and more convenient carp products offered to consumers.

The regularity, if not the predictability, of the European carp market is indicated by patterns in prices extending over several years, which exhibit clear long-run price trends that overshadow sometimes volatile immediate-term price movements. The prices include ex-farm, or primary level prices, whose movements tend to be reflected farther along the distribution chain, especially for a product like live fish undergoing little additional processing. Even significantly processed products like fillets show price movements similar with those at the primary, or raw material level, where large movements in the primary product price are reflected even weeks later in processed product prices movements in the same direction.

Table 20. Carp: Major importers from EU Member States					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Germany	8.376	8.022	7.802	8.185	-2,3%
Slovakia	2.734	2.563	2.708	2.557	-6,5%
France	2.013	2.039	2.096	1.647	-18,2%
Austria	1.887	1.958	1.930	1.992	5,5%
Romania	1.245	1.245	1.199	2.196	76,4%
Subtotal	16.255	15.826	15.734	16.577	2,0%
Total	**27.715**	**28.151**	**26.837**	**34.532**	**24,6%**
Subtotal share	58,6%	56,2%	58,6%	48,0%	

***Source**: Eurostat*

The leading carp importers among EU Member States include **Germany**, **Slovakia**, **France**, **Austria** and **Romania**. Combined, these markets accounted for 48,0 percent of total EU carp imports in 2015, down from 56-59 percent during the previous three years. For each of these countries the dominant product form imported is live carp, which is how carp is most often marketed in Central and Eastern Europe.

Regarding the largest consumption markets for carp, most EU markets for carp relay on domestic production, with the exception of Germany which imports 30% of its consumption and recently recorded a sharp drop in production.

Poland is the main European market for common carp, with apparent consumption totalling 21.152 tonnes in 2013, the latest available year. The **Czech Republic** is the next largest market for common carp (12.140 tonnes), followed by **Hungary** (11.876 tonnes), **Germany** (8.210 tonnes), **Romania** (3.980 tonnes) and **Lithuania** (2.508 tonnes).[24]

The main volumes of carp on the European market are sold as **live fish**. When carp are sold locally, farming enterprises often sell carp directly to supermarket chains, wholesalers or individual consumers from the farms.

A clear sign of the adaptability of Europe's carp market and industry is the emergence of **new processed products**. New carp products are being developed as a key competitive strategy by producers in Eastern and Central Europe who seek to maintain market share and even grow it, especially to younger consumers who tend toward new and more convenient products of every type.

New carp products are coming from producers especially in local market areas (as opposed to international distribution of traditional products). These producers offer a range of **value added products** in addition to live fish, such as carp steaks (fresh, frozen, smoked, salted or in other forms), carp cuts, soup packages (including by-products such as heads and tails) and carp snacks in form of salted and dried carp, carp pates and other products. Value-added carp products are mostly distributed locally because of the limits on small-scale production volumes, which can be much more flexible and responsive to market conditions than large factories dedicated to one product. Some carp producers are trying to diversify their carp products by setting up small processing units to supply semi-prepared products (carp steaks, fresh or smoked, filleted or sliced carp) and prepared products based on aditional recipes. Finally, a large part of European live carp production is also allocated for supplying recreational fishing ponds, which is a growing activity.

[24] Case study "Price structure in the supply chain for fresh carp in Central Europe", EUMOFA, 2016, p. 9. Available at http://www.eumofa.eu/documents/20178/76127/Price+structure+in+the+supply+chain+for+fresh+carp+in+Central+Europe.pdf/8d496466-e365-4cc7-a0c8-635cfbf65f3f?version=1.1.

Firms looking to enter or expand in the EU carp market face a variety of challenges. Traditionally, carp is consumed around the Christmas period, and it is sold as live fish, which creates some logistical issues. One such issue is the need to ensure product quality, an especially acute problem with fish, whose consumers are famous for demanding high (or at least consistent) quality. Add to that the fact that the fish is marketed live, and the quality challenges faced by carp farmers multiply.

A related product-quality issue is the strong **seasonal nature of demand** for the product. For most of the year there is relatively little demand for a live, highly perishable seafood, which must be stored safely and made ready for the seasonal rush of consumers. Some carp farming enterprises are seeking to deal with this challenge in selling carp by creating new (and less perishable) products from carp, which might then serve to spread demand and sales more evenly during the year.

Another challenge for carp marketers in any given EU country is increasing **competition** from both within and outside the EU, from carp suppliers as well as suppliers of close seafood substitutes. To face this challenge, and the seasonal demand problem discussed above, some producers are developing new marketing tactics and innovative and convenient products which attract both existing and new customers.

Finally, there is a growing need to cater to consumers' interests in "**environment-friendly**" products, including seafood. Therefore, fish farms in some areas have begun production of "bio carp." Quality labelling and consumer education about how the carp are produced in extensive or semi-intensive systems that are environment-friendly technologies, may increase the acceptance of common carp by certain groups of consumers.

Table 21. Carp (Mirror)*: Selected retail on-line prices in the UK

Product	Size	Price	Price/kg	Price/kg (euros)
1x Mirror carp 4+ svgs	2.150g	£45,20	£21,02	€ 23,62
1x Mirror carp 4+ svgs	2250g	£47,30	£21,02	€ 23,62
1x Mirror carp 4+ svgs	2.300g	£48,30	£21,00	€ 23,60
1x Mirror carp 4+ svgs	2.400g	£50,40	£21,00	€ 23,60
1x Mirror carp 4+ svgs	2.500g	£52,50	£21,00	€ 23,60
2xXXL Mirror carp fillets	1.020g	£40,80	£40,00	€ 44,95
1xL Mirror carp fillet	560g	£22,40	£40,00	€ 44,95
1xL Mirror carp fillet	600g	£24,00	£40,00	€ 44,95

**Mirror carp is a variety of European carp that is closely related to the Common carp.*

***Source**: https://www.thefishsociety.co.uk/suprafishlong/carp/. 3Q2017 price information.*

An interesting example of carp products can be noted in the UK, which has recently witnessed rising demand for carp due to diversification of fish species in retail channels and preferences of many consumers from Central and Eastern Europe. For example, whole fresh mirror carp is priced GBP 45,20 (€ 50,00) per 2,1 kg, while carp fillets reach GBP 40,80 (€ 45,80) per 1,0 kg[25].

[25] https://www.thefishsociety.co.uk/suprafishlong/carp/carp.html

Case study:

High quality niche product

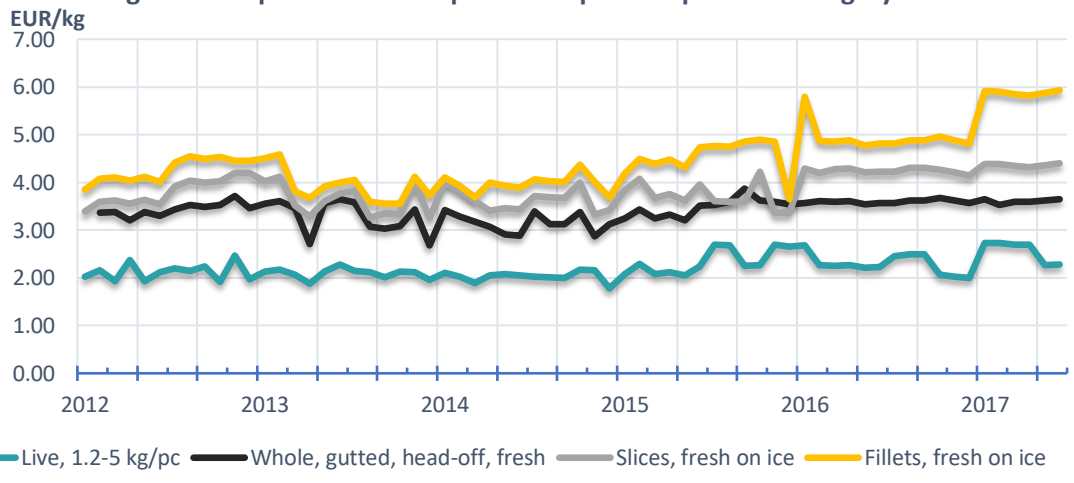
Protected Geographical Indication for Romanian bighead carp

Novac afumat din Tara Bârsei, a type of Romanian bighead carp (*Hypophthalmichthys nobilis*), won protected geographical indication (PGI) status from the European Commission in March 2017. The bighead carp is reared in the Barsa region in mountainous central Romania for three years before being harvested. The environmental conditions and the three-year rearing period result in a fish that is lower in fat than the same species cultivated in the lowlands. The fish is processed into fillets which are then smoked employing traditional local salting and smoking techniques using sawdust from beech. The process gives the fillets a golden-yellow to brown lustre, a firm texture, and a smoky flavour. The PGI status is based on the fact that since time immemorial, the people of this region have practiced fishing and fish preservation methods, including hot smoking using beech sawdust. The application for PGI status was driven by Doripesco, a fish farming and processing company that focuses on high quality niche products.

***Source**: Eurofish Magazine, 2017*

The ex-farm price of **live carp** in Hungary, which remained stable at around 2 €/kg in the period 2012-2015 with the exception of Christmas Eve peaks, started increasing since the second half of 2015. Reaching 2,70 €/kg in the end of 2015 and beginning of 2016, it followed cycles of prices bottom to 2,00 – 2,20 €/kg during 2016 and increasing again to 2,70 €/kg in the first months of 2017. Ex-farm prices for **whole (gutted) carp** were more stable in 2016-2017, compared to live carp, averaging 3,60 €/kg. While **fresh sliced** carp achieved 4,30 €/kg, the highest price was observed for **fresh carp fillets** reaching nearly 6,00 €/kg in the first months of 2017.

Figure 3: Carp - Ex-farm and processed product prices in Hungary



Source: European Price Report, Globefish

The retail prices for carp species highly vary on the European markets. For example, fresh Common carp was recently priced at 19,59 €/kg in a fishmonger in Germany, whereas prices for value-added carp products such as fillets, steaks, and smoked carp steaks started with 5,95 euros per 200-300g, depending on the product[26].

Picture 2: Selection of value-added carp products in Germany

***Source**: www.fischkaufhaus.de*

A comparison of carp prices in various retail stores in the main European markets showed that retail prices in EU supermarkets varied considerably by country and product form.[27] In **Lithuania**, carp gutted with head, fresh, was priced at €4,79, fresh steak at €7,99, and fresh whole at €3,79. In **Latvia**, fresh cleaned carp was priced at €5,61. In **Estonia**, a highly value-added product – dried carp fillets with salt and pepper - was priced at €44,75. In **Poland**, another value-added product – smoked fillets in jelly with parsley – was priced at €10,47. In **Hungary**, fresh carp slices were priced at €8,01.

[26] https://www.fischkaufhaus.de/28-karpfen

[27] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

European crayfish *(Astacus astacus)*

Introduction

European crayfish (*Astacus astacus*) (often called noble crayfish) are freshwater crustaceans that resemble miniature lobsters, ranging in size up to 12-16cm in length. They are indigenous and widespread throughout Europe. This species range extends from **Russia** and **Ukraine** in the east, to **Finland, Sweden, Norway** in the north, to **Greece** in the south, and the **United Kingdom** and **France** in the west[28]. In the wild, European crayfish has undergone significant declines in wild population numbers due to non-indigenous crayfish species, crayfish plague, habitat loss and over-harvesting.[29] It is listed as a vulnerable species on the IUCN Red List.

Production

Aquaculture production, along with fishery output, has declined in recent years. **Ukraine** is one of the largest Extra-EU producers of farmed European crayfish, however, its output fell from 4 tonnes in 2010 to 0,2 tonnes in 2012, before recovering slightly to 1 tonne in 2014. Reportedly, Ukrainian aquaculture in general suffers from high costs of feed (of varying quality) and energy, and from poor water quality in the country's network of freshwater systems – one of the largest in Europe.[30]

Table 22. European crayfish: EU and extra-EU aquaculture production

	2010	2011	2012	2013	2014	2015	2010-2015*
EU:	----------(tonnes)----------						(%)
Estonia	0,4	0,6	0,1	0,4	0,2	0,6	50%
Other	0	0	0	0	0	0	n/a
Subtotal	**0,4**	**0,6**	**0,1**	**0,4**	**0,2**	**0,6**	**50%**
Extra-EU:							
Ukraine	4	2	2	0,2	1	n/a	-75%
Other	0	0	0	0	0	n/a	0
Subtotal	**4**	**2**	**2**	**0,2**	**1**	**n/a**	**-75%**
Total	**4,4**	**2,6**	**2,1**	**0,6**	**1,2**	**n/a**	**-73%**

**For Extra-EU and Total, 2010-2014 data are used*

***Source**: Fishstat, FAO*

In the EU, aquaculture farming of European crayfish has been limited, with a reported production of 600 kg in 2015, according to Eurostat. All reported volume was produced in **Estonia**, which has substantial expertise in production of this species. Production of European crayfish is also carried out in **Latvia**, where about 100 kg of the species were produced in 2015, keeping the stable volume of production in the past years.

[28] "Astacus astacus, Noble Crayfish" Assessment by: Edsman, L., Fureder, L., Gherardi, F. & Souty-Grosset, C., The IUCN Red List of Threatened Species™

[29] http://www.iucnredlist.org/details/summary/2191/0

[30] Fishery Country Profile: Ukraine. FAO, 2004 (ftp://ftp.fao.org/fi/DOCUMENT/fcp/en/FI_CP_UA.pdf).

There is growing interest in using recirculating aquaculture systems (RAS) to raise European crayfish, a valuable and once plentiful food species in Europe, but now a highly endangered species. RAS culture allows this valuable species to be cultured in controlled, disease-free enclosed systems—resulting in high-value food products as well as high-quality seedlings for restocking purpose.[31]

EU inland fisheries have always been the largest source of supply of European crayfish to the market, with production (recorded from Finland only) of about 40 tonnes in most recent years.

While crayfish from fisheries are "wild," the fisheries (usually in ponds) are often stocked with farm-raised juveniles to support population abundance in the fisheries.

Trade

European crayfish are grouped with other crayfish species in trade data reported under the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members). Crayfish trade data are reported for subheadings under the CN heading 0306.

EU Combined Nomenclature: Provisions for crayfish

0306	Crustaceans, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; smoked crustaceans, whether in shell or not, whether or not cooked before or during the smoking process:
0306 19 10	Freshwater crayfish, frozen
0306 39 10	Freshwater crayfish, live, fresh or chilled

Between 2012 and 2015, EU crayfish exports decreased by over 44 percent in both value and volume, even as average unit values of exports stayed unchanged despite a temporary drop in unit value in 2013. Frozen crayfish is the dominant product form, because of a short shelf-life for the fresh product, and exports of frozen crayfish grew by 49,8 percent in value and 45,9 percent in volume between 2012 and 2015.

Table 23. Crayfish: EU exports (value and volume)

		2012	2013	2014	2015	2012-2015
Frozen	€ 1.000	22.927	15.610	12.261	11.498	-49,8%
	Tonnes	2.661	2.785	1.555	1.440	-45,9%
Fresh	€ 1.000	11.033	8.511	6.715	7.436	-32,6%
	Tonnes	1.018	930	652	609	-40,2%
Fresh plus Frozen	€ 1.000	33.960	24.121	18.976	18.934	-44,2%
	Tonnes	3.679	3.715	2.207	2.049	-44,3%

***Source**: Eurostat*

EU crayfish imports followed a different trend, with declining volumes offset by sharply higher unit values, to result in large increases in import value. Total imports rose by 19,8 percent in value, to € 77,7 million in 2015, while volume declined by 4,3 percent to 8,388 tonnes. As a result, the average unit value (euro/kg) of imports grew by 25,1 percent, to 9,27 €/kg in 2015. As with exports, EU imports consist mostly of crayfish in frozen form; total imports of frozen crayfish grew by 23,3 percent in value and fell by 0,5 percent in volume during this period.

[31]Seemann, U., Lorkowski, K., Slater, M. J., Buchholz, F. and Buck, B. H. (2015): Growth performance of Noble Crayfish *Astacus astacus* in recirculating aquaculture systems, Aquaculture International. doi: 10.1007/s10499-014-9859-2 (http://epic.awi.de/37708/).

Table 24. Crayfish: EU imports (value and volume)						
		2012	2013	2014	2015	2012-2015
Frozen	€ 1.000	41.807	47.384	44.366	51.542	23,3%
	Tonnes	6.087	6.402	5.120	6.057	-0,5%
Fresh	€ 1.000	23.072	22.015	24.821	26.191	13,5%
	Tonnes	2.674	2.461	2.424	2.331	-12,8%
Fresh plus Frozen	€ 1.000	64.879	69.399	69.187	77.733	19,8%
	Tonnes	8.761	8.863	7.544	8.388	-4,3%

***Source**: Eurostat*

Between fresh and frozen crayfish products, the share of frozen in total (frozen plus fresh) imports was fairly steady during 2012-2015, with 68-72 percent of import volume and 70-75 percent of import value being frozen product. Unit values of fresh crayfish (imported or exported) were consistently higher than unit values for frozen crayfish.

Table 25. Crayfish: Major exporters to EU Member States					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Spain	32.375	33.219	33.442	40.348	24,6%
Netherlands	4.346	7.071	10.951	12.100	178,5%
Denmark	7.481	6.097	4.910	3.852	-48,5%
Turkey	2.314	2.723	2.161	2.893	25,1%
Italy	1.888	2.284	2.538	2.474	31,0%
Belgium	2.158	2.568	2.492	1.599	-25,9%
Subtotal	**50.562**	**53.963**	**56.495**	**63.267**	**25,1%**
Total EU imports	**64.879**	**69.399**	**69.187**	**77.733**	**19,8%**
Subtotal share	**7,9%**	**77,8%**	**81,7%**	**81,4%**	

***Source**: Eurostat*

The largest exporters of crayfish to EU Member States (from all sources worldwide) are (in declining order of value) **Spain, the Netherlands, Denmark, China, Turkey, Italy,** and **Armenia**. Together these exporters accounted for 79-83 percent of total imports by all EU countries combined during 2012-2015. Taking the top EU exporters alone, they accounted for 74-78 percent of the total. Spain has the lion's share of world export supply to EU crayfish importers, at 48-52 percent of the total each year during 2012-2015.

Table 26. Crayfish: Baltic countries' shares of EU trade					
	2012	2013	2014	2015	2012-2015
Baltic exporter:	--------Baltic export value in € 1.000------				
Estonia	0,3	0,0	86,9	47,0	18.560%
Latvia	1,5	1,9	2,3	2,3	53%
Lithuania	4,3	53,5	16,0	10,4	144%
Total Baltic exports	6,0	55,3	105,1	59,8	889%
Total EU imports	**64.879**	**69.399**	**69.187**	**77.733**	20%
Share of EU imports shipped by Baltic exports:	0,01%	0,08%	0,15%	0,08%	
Baltic importer:	--------Baltic import value in € 1.000------				
Estonia	52,5	5,3	3,7	2,4	-95%
Latvia	5,5	8,6	6,6	5,4	-3%
Lithuania	2,7	0,9	66,0	51,2	1.805%
Total Baltic imports	60,7	14,8	76,3	59,0	-3%
Total EU exports	**33.960**	**24.121**	**18.976**	**18.934**	-44%
Share of EU supply imported by Baltic countries:	0,18%	0,06%	0,40%	0,31%	

***Source**: Eurostat*

The proportion of total EU crayfish imports that are supplied by exporters in **Estonia, Latvia** and **Lithuania**, and the proportion of EU exports that are destined for markets in those countries, are both small, less than one percent. However, both measures of trade grew tremendously between 2012 and 2013, before dropping back a bit in 2015. In 2015, 0.08 percent of all EU imports of crayfish were supplied by exports from the three subject Baltic countries, up from only 0.01 percent in 2012. Of total EU exports of crayfish in 2015, 0.31 percent were destined for Baltic markets, up from 0.18 percent in 2012.

Market

Crayfish is a popular freshwater fish food, with social and cultural importance, commonly eaten during festive warm-weather occasions.[32] Many smaller crayfish producers develop their own markets, either through direct sales to restaurants and catering services. Some producers sell their product to larger producers who act as wholesalers. Crayfish are **most often marketed live**, but much is marketed in fresh or frozen forms. Live crayfish can be transported long distances provided they are kept cool and moist. Fresh or frozen crayfish, like other crustaceans, deteriorate quickly after death and have a shorter shelf life. Fresh or frozen crayfish can be **marketed either whole or as tail meat only**. Whole crayfish are generally marketed by size count, with larger crayfish commanding higher prices. Product quality, appearance (e.g., no missing legs) and consistency of supply are also important marketing factors.

The size and potential of possible export markets, as well as the domestic demand for more freshwater crayfish at current prices, may create opportunities for new entrants. However, risks are associated with

[32] According to one source, schnapps-driven crayfish parties are popular in late summer, especially among Scandinavians. "Crayfish season off to a slow start this year," 22 July 2017, https://yle.fi/uutiset/osasto/news.

crayfish production and some projected export earnings may be based on markets that are yet to be secured because of shortage of production.

Despite the risks, significant quantities of EU crayfish are exported to other markets. Most EU exports of crayfish find markets in other EU Member States. In recent years, the largest export markets (the largest importers from EU producers) include **France, Germany, Belgium, the USA, Spain,** and **Romania**. Together these importers accounted for 69-84 percent of total exports by all EU Member States combined during 2012-2015. Excluding non-EU importers (i.e., the USA), the share held by the top EU Member State crayfish importers for all EU exports dropped to 57-80 percent annually during 2012-2015.

Table 27. Crayfish: Major markets for EU Member State exports

	2012	2013	2014	2015	2012-2015
	----------Value in €1.000----------				
France	6.301	5.438	5.753	5.851	-7,2%
Germany	12.565	2.119	1.155	886	-92,9%
Belgium	5.964	3.074	3.013	3.216	-46,1%
USA	1.408	3.065	1.568	1.379	-2,0%
Spain	1.322	2.189	568	1.712	29,5%
Romania	908	1.009	1.061	1.216	33,8%
Subtotal	28.469	16.894	13.119	14.260	-49,9%
Total EU exports	**33.960**	**24.121**	**18.976**	**18.934**	**-44,2%**
Subtotal share	83,8%	70,0%	69,1%	75,3%	

***Source**: Eurostat*

Table 28. Crayfish: Retail on-line prices for selected products in the UK

Product	Size	Price	Price/kg	Price/kg (euros)
1 block x c17 crayfish in white wine liquor	500g	£10,90	£21,80	€24,41
1 pack pld cray tails 2-4 svgs	250g	£11,40	£45,60	€51,05
SAVER PACKS				
4 blocks crayfish/ wine	2.000g	£38,90	£19,45	€21,78
4x pld cray tails	1.000g	£42,90	£42,90	€48,03
CATERPACK 12x crayfish/ wine	6.000g	£99,00	£16,50	€18,47

***Source**: https://www.thefishsociety.co.uk/suprafishlong/crayfish/crayfish.html . 3Q2017 price information*

Crayfish are marketed in a variety of forms, each requiring different amounts of labour and therefore commanding different retail prices. In one example, a UK on-line retailer, a 2 kg block of whole crayfish was offered for sale for the equivalent of 21,78 €/kg, while a 1 kg block of peeled tails was priced at the equivalent of 48,03 €/kg, because of the higher costs required to produce a substantially processed product, as well as differences in the percentage yield of meat from a kg of whole animals versus a kg of peeled tails.

A comparison of crayfish prices in various retail stores in the main European markets showed that retail prices for crayfish in EU supermarkets varied considerably by country and product form.[33] Some of the highest prices were for fresh whole crayfish, including €34,90 in the **Netherlands**. Frozen crayfish (presumably whole) was priced at €10,50 in **Estonia**. Crayfish tails are more common than whole crayfish; fresh tails were priced at €37,40 in **Germany**, and tails prepared or preserved (in unspecified form) were priced at €21,14 in **Latvia** and €17,77 in **Denmark**. Also in Denmark, frozen cooked tails were priced at €39,20, and cooked tails in brine at €27,67. Value-added products included crayfish salad in Denmark for €24,15 and "home-made" salad for €30,21. In **Estonia**, crayfish in white wine sauce was priced at €8,58.

[33] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

European eel *(Anguilla Anguilla)*

Introduction

The European eel (*Anguilla anguilla*) is found in fresh, brackish and coastal waters in almost all of Europe as well as northern and western Africa. It is a catadromous fish – it spawns and is born at sea, then migrates to inland waters to grow. European eel reproduce in the Atlantic Ocean (the exact location is believed to be the Sargasso Sea), from where the larvae return to coastal and inland waters by drifting on the Gulf Stream. Harvests of eels occur at all post-larval stages, from glass eels (immature stage, under 12 cm long) to elvers (juveniles, 12-20 cm long) to adults prior to their return to the ocean to spawn.

Production

European eels are harvested from the wild, either as adults directly for food or as juveniles for raising on farms. Eel aquaculture is extremely difficult when it involves raising them captive in ponds, where reproduction is rarely successful. Because attempts to reproduce eel in captivity have been unsuccessful so far, aquaculture production currently relies on catches of immature fish that are raised in intensive rearing installations using recirculation systems.[34] European scientific research has, however, shown promising signs that the problems in rearing eels in captivity may eventually be overcome.[35]

Young glass eels are caught in the estuaries of **Portugal, Spain, France** and the **United Kingdom**. The eel fishery is regulated under the 2007 European recovery plan (EU Regulation 1100/2007),[36] which advises Member States to set aside a large proportion of glass eel catches (60% from 2013) for wild ecosystem restocking programmes. Because European eel is classified as "critically endangered" (the worst category short of extinction) by the IUCN[37] (reportedly owing to destruction of freshwater habitat, overharvesting, migration obstructions, and other causes), this component of EU eel management and regulation (carried out at the Member State level) is an essential part of EU management of European eel. [38] Eel management plans are in place in most EU Member States, including the Baltic countries.

When delivered to fish farmers, glass eels spend weeks in quarantine and are treated for any diseases that may be detected. They are fed natural foods (e.g. fish eggs) and are gradually weaned to a paste

[34] "Factsheet on eel as a farmed species," European Commission. (https://ec.europa.eu/fisheries/marine_species/farmed_fish_and_shellfish/eel).

[35] "Reproduction of European eel (REEL): Consolidation and new production methods." Jonna Tomkiewicz, et al., National Institute of Aquatic Resources, Technical University of Denmark (DTU), DTU Aqua Report series, June 2012 (http://orbit.dtu.dk/fedora/objects/orbit:114074/datastreams/file_10287345/content).

[36] Council Regulation (EC) No 1100/2007 of 18 September 2007, "establishing measures for the recovery of the stock of European eel" (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32007R1100).

[37] "The IUCN List of Threatened Species: Anguilla Anguilla," International Union for Conservation of Nature and Natural Resources. (http://www.iucnredlist.org/details/60344/0).

[38] "Factsheet on national eel management plans," European Commission. (https://ec.europa.eu/fisheries/marine_species/wild_species/eel/management_plans). See also, CITES, (www.cites.org) and and ICES, "Enlisting for CITES-listed European eel (http://www.ices.dk/news-and-events/news-archive/news/Pages/Potential%20future%20trade%20for%20CITES-listed%20eel.aspx).

made of fishmeal and fish oil. When they weigh 5 g, they are transferred to juvenile rearing tanks where they are fed pellets of fishmeal and vegetable extracts. [39]

Table 29. European eel: EU and extra-EU aquaculture production, by country (tonnes)

Country	2010	2011	2012	2013	2014	2015
Production within EU:						
Netherlands	3.000	2.050	1.800	2.885	2.335	2300
Denmark	1.532	1.154	1.061	712	789	1.232
Germany	398	660	460	471	643	1.147
Estonia	20,3	2,0	0	0	127,0	0
Other	1.443	1.324	1.533	1.291	1.283	1.061
Subtotal	**6.393**	**5.190**	**4.854**	**5.359**	**5.177**	**5.740**
Extra-EU production:						
Morocco	110	68	80	340	350	280
Tunisia	10	3	2	3	2	1
Montenegro	9	9	n/a	n/a	n/a	n/a
Other	4	0	n/a	n/a	n/a	n/a
Subtotal	**133**	**80**	**82**	**343**	**352**	**281**
European eel, total	**6.526**	**5.270**	**4.936**	**5.702**	**5.529**	**6.021**

***Source**: Fishstat, FAO*

Eel production in Europe and beyond has followed an irregular trend in recent years. World production totaled just over 6 thousand tonnes in 2015, up from a recent low of 4.9 thousand tonnes in 2012. The largest producers are EU countries, including the **Netherlands, Denmark** and **Germany**, which accounted for over 95 percent of the world total in 2015. **Estonia** produced 127 tonnes in 2014, up sharply from levels in previous years. Estonian eel farmers sell their product in domestic as well as foreign markets[40]. Non-EU production is supplied mainly by **Morocco**, with output of 280 tonnes in 2015.

The largest European producers are successful reportedly because of their significant technological edge over competitors. There also are strong links between farms and the processing industry (smokeries) and between farms and restocking operators (glass eels holding in tanks, and young eels production), adding to production efficiencies. In addition to eels raised on farms, a significant supply has also come directly from wild inland fisheries.

[39] "Factsheet on eel as a farmed species," European Commission. (https://ec.europa.eu/fisheries/marine_species/farmed_fish_and_shellfish/eel).

[40] "Estonian Fishery 2014-2015", Fisheries Information Center, 2017

Table 30. Inland fisheries production of European eel (tonnes)						
Species /Country	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Production within EU:						
United Kingdom	461	459	418	426	399	353
Netherlands	301	369	340	316	324	320
Germany	224	225	214	262	156	159
Other	900	536	431	430	541	344
Subtotal	**1.886**	**1.589**	**1.403**	**1.434**	**1.420**	**1.176**
Extra-EU production:						
Egypt	345	208	5.043	662	489	659
Turkey	182	28	38	48	56	71
Albania	55	45	9	9	9	45
Other	77	58	57	58	27	25
Subtotal	**659**	**339**	**5.147**	**777**	**581**	**800**
European eel, total	**2.545**	**1.928**	**6.550**	**2.211**	**2.001**	**1.976**

***Source**: Fishstat, FAO*

With the exception of a jump in Egyptian output in 2012, annual global production of European eels from inland fisheries has been relatively steady, ranging between 1.928 tonnes and 2.545 tonnes each year during 2010-2015. Inland production of European eels by EU Member States, led by the **UK,** the **Netherlands** and **Germany**, dominates world supply, accounting for 70 percent of world production. Non- or extra-EU production, led by **Egypt, Turkey** and **Albania**, averaged about 30 percent of the world total.

Trade

In international trade statistics, European eels are grouped together with other eel species, therefore, the trade of the species separately is not available. In the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members), eels are provided for under CN headings 0301, 0302, 0303, 0304, and 0305.

EU Combined Nomenclature: Provisions for European eels

0301	Fish, live:
0301 92 10	Eels, of a length of less than 12 cm
0301 92 30	Eels, of a length of 12 cm or more but less than 20 cm
0301 92 90	Eels, of a length of 20 cm or more
0302, 0303	Fish, excluding fillets and other meat, fresh, chilled or frozen:
0302 74 00	Eels, fresh or chilled
0303 26 00	Eels, frozen
0304	Fish fillets and other meat, fresh, chilled or frozen (*Note: also includes carp and snakeheads*):
0304 39 00	Fresh or chilled
0304 69 00	Frozen
0305	Fish, smoked:
0305 44 00	Eels, including fillets

Volumes and values of eel trade by EU Member States (including among one another) fell across the board during 2012-15. During the period, imports fell by about 30 percent in both value and volume. Total export volume declined by 16.1 percent, but total value dropped by 30 percent, due to sharply lower average unit values (down 16 percent) received for exports.

Table 31. European eels, all product forms: EU imports, Intra-EU and Extra-EU					
	2012	2013	2014	2015	2012-2015
Value in € 1.000					
Intra-EU	44.266	39.192	26.397	30.006	-32,2%
Extra-EU	12.440	11.291	9.197	9.395	-24,5%
Total	**56.707**	**50.482**	**35.594**	**39.400**	**-30,5%**
Volume in tonnes					
Intra-EU	5.047	5.135	4.176	3.382	-33,0%
Extra-EU	773	823	764	708	-8,4%
Total	**5.821**	**5.958**	**4.940**	**4.090**	**-29,7%**

***Source**: Eurostat*

On the export side, EU eel exports beyond EU borders are strictly regulated by EU/CITES prohibitions on trade in endangered species, and European eel is on the "Critically Endangered" list. Therefore, exports beyond EU borders are banned except with a CITES export certificate. As a result, nearly all exports from EU Member States are destined for other EU Member States.

Table 32. European eels, all product forms: EU exports, Intra-EU and Extra-EU					
	2012	2013	2014	2015	2012-2015
Value in € 1.000					
Intra-EU	85.829	74.482	60.539	62.287	-27,4%
Extra-EU	6.839	3.690	4.008	2.751	-59,8%
Total	**92.668**	**78.172**	**64.546**	**65.037**	**-29,8%**
Volume in tonnes					
Intra-EU	5.981	5.465	5.887	5.178	-13,4%
Extra-EU	237	74	75	36	-84,8%
Total	**6.218**	**5.539**	**5.962**	**5.214**	**-16,1%**

***Source**: Eurostat*

Of the largest exporting countries that supply EU markets, the **Netherlands** leads the list, followed by **France, China, Germany** and **Denmark**. Each of these suppliers contributed to an overall decline in export supply to EU Member States (which in aggregate fell by 36 percent in value and 30 percent in volume) during 2012-2015.

Table 33. European eel: Leading exporters to EU Member States					
	2012	2013	2014	2015	2012-2015
Value	----------**Value in € 1.000**----------				(%)
Netherlands	16.530	17.713	12.948	11.511	-30,4%
France	12.815	11.135	8.032	10.273	-19,8%
China, P.R.	11.288	10.322	8.470	7.892	-30,1%
Germany	12.002	9.221	6.825	4.683	-61,0%
Denmark	11.082	8.142	6.536	6.938	-37,4%
Subtotal	63.717	56.533	42.811	41.298	-35,2%
Other	20.807	20.875	12.062	12.542	39,7%
World total	**84.524**	**77.408**	**54.873**	**53.840**	**-36,3%**
Subtotal (%)	73,8%	67,4%	73,7%	70,1%	

***Source:** Eurostat.*

Table 34. European eel: Leading exporters to EU Member States					
	2012	2013	2014	2015	2012-2015
Volume	----------Volume in tonnes----------				(%)
Netherlands	1.392	1.404	1.091	851	-38,9%
France	590	517	570	502	-14,9%
China, P.R.	398	522	490	430	-8,0%
Germany	963	847	741	364	-0,6%
Denmark	951	730	748	721	-24,2%
Subtotal	4.295	4.019	3.640	2.868	-33,2%
Other	1.525	1.940	1.300	1.222	-19,9%
World total	**5.821**	**5.958**	**4.940**	**4.090**	**-29,7%**
Subtotal (%)	73,8%	67,4%	73,7%	70,1%	

***Source**: Eurostat*

Live eels account for just over half of the volume of all EU eel imports and two-thirds of all eel exports. Trade in live eels consists of three categories grouped together: glass eels (under 12cm in length) and elvers (12-20cm), which mostly go to eel farming facilities (some go directly for consumption), and adults (over 20cm in length), which are usually destined directly for seafood markets. Almost all EU trade is of either glass eels or adult eels, very little of elvers. In addition, almost all EU trade, imports as well as exports, is intra-EU trade, i.e., trade between EU Member States; very little trade involves non-EU countries.

Table 35. European eels, live: EU imports, all partners					
	2012	2013	2014	2015	2012-2015
EU imports, by source:					
Value in € 1.000					
Intra-EU	47.443	38.468	25.322	23.048	-51,4%
Extra-EU	2.873	1.813	1.781	1.791	-37,7%
Total	**50.316**	**40.281**	**27.103**	**24.838**	**-50,6%**
Volume in tonnes					
Intra-EU	3.159	2.733	2.298	1.831	-42,0%
Extra-EU	268	203	216	179	-33,4%
Total	**3.427**	**2.936**	**2.514**	**2.010**	**-41,4%**

***Source**: Eurostat*

Table 36. European eels, live: EU exports, all partners					
	2012	2013	2014	2015	2012-2015
EU exports, by destination:					
Value in € 1.000					
Intra-EU	59.805	50.500	38.456	42.314	-29,2%
Extra-EU	0	5	1.125	438	n/a
Total	**59.805**	**50.505**	**39.582**	**42.752**	**-28,5%**
Volume in tonnes					
Intra-EU	4.235	3.667	3.674	3.533	-16,6%
Extra-EU	0	0	36	12	n/a
Total	**4.235**	**3.667**	**3.710**	**3.545**	**-16,3%**

***Source**: Eurostat*

Overall, EU imports as well as exports of live eels declined during 2012-2015. In 2015, **imports** of 2 thousand tonnes, valued at € 24,8 million, were 41,4 percent and 50,6 percent lower, respectively, than import volume and value in 2012. As these percentages suggest, weak price trends were in place during this period, leading to relatively high declines in total import value.

Total EU **exports** of 3,5 thousand tonnes, valued at € 42,7 million, were shipped (mostly within the EU) in 2015; these exports were 16,3 percent and 28,5 percent lower, respectively, than export volume and value in 2012. As with imports, average annual prices declined during this period, contributing to the decline in total export value.

Fresh or **frozen eels** make up 17 percent of total EU imports and 20-24 percent of exports. The fresh-eel share of this fresh/frozen group is about one-third of imports and 55 percent of exports. Their unit values were similar during 2012-2015: for fresh eels, import unit values averaged 11,87 €/kg and export unit values averaged 13,57 €/kg, and for frozen eels, import and export unit values averaged 9,23 €/kg and 11,91 €/kg, respectively. For purposes of this analysis, fresh and frozen eel products are combined.

Table 37. European eels, fresh/frozen: EU imports, all partners

	2012	2013	2014	2015	2012-2015
EU imports, by source:					
Value in € 1.000					
Intra-EU	11.839	11.444	9.959	11.202	-5,4%
Extra-EU	1.195	699	159	379	-68,3%
Total	**13.034**	**12.143**	**10.118**	**11.580**	**-11,2%**
Volume in tonnes					
Intra-EU	778,2	805,1	897,2	831,8	6,9%
Extra-EU	119,6	90,6	31,6	56,9	-52,4%
Total	**897,8**	**895,7**	**928,8**	**888,7**	**-1,0%**

***Source**: Eurostat*

Table 38. European eels, fresh/frozen: EU exports, all partners

	2012	2013	2014	2015	2012-2015
EU exports, by destination:					
Value in € 1.000					
Intra-EU	14.638	13.276	13.734	11.668	-20,3%
Extra-EU	2.790	114	37	48	-98,3%
Total	**17.428**	**13.390**	**13.770**	**11.715**	**-32,8%**
Volume in tonnes					
Intra-EU	1.174	1.227	1.742	1.191	1,5%
Extra-EU	196	26	5	5	-97,6%
Total	**1.370**	**1.253**	**1.747**	**1.196**	**-12,7%**

***Source**: Eurostat*

Both exports and imports of fresh/frozen eels consist mostly of intra-EU trade. Export volume of 1.2 tonnes in 2015 was 12.7 percent lower than export volume in 2012 of 1.4 tonnes, while export value of € 11.7 million in 2015 was 32.8 percent lower than export value in 2012 of € 17.4 million. The share of

total EU exports destined for non-EU markets fell to almost zero during this period, especially exports to Russia and Hong Kong, both of which ceased altogether.

EU trade in **smoked eels and eels otherwise processed or preserved** (e.g., cooked or cured and packed in airtight containers) totaled 1.2 tonnes, valued at € 17,4 million, of imports in 2015, a decline of 20 percent in volume and 18 percent in value from 2012 imports of 1.5 tonnes, valued at € 21.2 million. Imports from non-EU sources actually increased in volume, however, growing by 22,7 percent, while the value of that trade declined by 20 percent. On the export side, trade in smoked eels followed a similar downward pattern. Total exports declined from 613 tonnes, valued at € 15,4 million, in 2012 to 473 tonnes, valued at € 10,6 million, in 2015.

Table 39. European eels, smoked/otherwise prepared: EU imports, all partners

	2012	2013	2014	2015	2012-2015
EU imports, by source:					
Value in € 1.000					
Intra-EU	9.929	14.394	8.622	8.414	-15,3%
Extra-EU	11.244	10.591	9.031	9.008	-19,9%
Total	**21.174**	**24.985**	**17.652**	**17.422**	**-17,7%**
Volume in tonnes					
Intra-EU	1.110	1.597	981	719	-35,2%
Extra-EU	385	529	516	473	22,7%
Total	**1.495**	**2.126**	**1.497**	**1.192**	**-20,3%**

***Source**: Eurostat*

Table 40. European eels, smoked/otherwise prepared: EU exports, all partners

	2012	2013	2014	2015	2012-2015
EU exports, by destination:					
Value in € 1.000					
Intra-EU	11.386	10.706	8.349	8.305	-27,1%
Extra-EU	4.049	3.572	2.846	2.265	-44,1%
Total	**15.435**	**14.278**	**11.194**	**10.570**	**-31,5%**
Volume in tonnes					
Intra-EU	572	571	471	454	-20,6%
Extra-EU	41	48	34	19	-53,3%
Total	**613**	**619**	**506**	**473**	**-22,8%**

***Source**: Eurostat*

Total EU exports of European eel to **Lithuania, Latvia** and **Estonia** account for a small share (between one and three percent) of total EU exports, however that share is growing. In 2015, **Baltic imports** of 95 tonnes, valued at € 1,43 million, equaled 1.8 percent of European exports by volume and 2.2 percent by value; however, both measures of the Baltic market's importance in terms of EU exports are rising significantly.

Table 41. Eels: Baltic share of EU total exports (value)					
	2012	2013	2014	2015	2012-2015
EU exports to:	----------Value in € 1.000----------				
Estonia	580,3	1.266,0	772,2	838,6	44,5%
Latvia	307,7	539,0	665,4	294,3	-4,3%
Lithuania	230,5	477,8	275,8	300,2	30,3%
Subtotal	1.118,4	2.282,8	1.713,4	1.433,1	28,1%
Total EU exports	**92.667,8**	**78.171,8**	**64.546,4**	**65.037,5**	**-29,8%**
Baltic share	1,2%	2,9%	2,7%	2,2%	

***Source**: Eurostat.*

Table 42. Eels: Baltic share of EU total exports (volume)					
	2012	2013	2014	2015	2012-2015
EU exports to:	----------Volume in tonnes---------				
Estonia	19,7	76,2	49,6	59,2	200,5%
Latvia	11,2	24,4	25,8	15,6	39,3%
Lithuania	14,2	14,2	15,3	20,2	42,3%
Subtotal	45,1	114,8	90,7	95,0	110,6%
Total EU exports	**6.218,0**	**5.539,1**	**5.961,9**	**5.214,3**	**-16,1%**
Baltic share	0,7%	2,1%	1,5%	1,8%	

***Source**: Eurostat*

Market[41]

In Europe, eel is largely considered a holiday food, reserved for festive meals at Christmas, Easter, and so on. Marketers are making efforts to broaden the eel market, but are faced with a variety of challenges that are becoming more frequent worldwide in the marketing of "overfished" or otherwise depleted fish species. Because of the CITES classification of European eel as critically endangered, supermarkets are under pressure by environmental NGOs not to stock European eel, and therefore retail sales are undertaken mainly by fishmongers and restaurants. As a result, retail prices for European eel are among the highest seafood prices in Europe.[42] The combined effects of the CITES restrictions and related NGO efforts, an ageing traditional consumer base, high prices, and the simple fact that the product looks like a snake, all mean that EU markets for European eel are small and have been declining for some time.

For eels exported by EU Member States to all markets worldwide, the largest markets are all within the EU. In order of declining import size during 2012-2015, they include: **Germany,** the **Netherlands, Italy, Belgium, Spain, Poland, Denmark** and the **UK**. Together these countries absorbed about 85 percent of all European eel exported by EU Member States during 2012-2015.

[41] Except for the trade data, this discussion is adapted from "Insights into the European eel market chain," FranceAgriMer, June 2014 (http://pics.vortskalandus.ee/uploads/Eel%20market%20chain%20in%20Europe%20-%202014%20insights%20-%20VIA%20AQUA%20for%20FranceAgriMer.pdf).

[42] Seemingly paradoxically, FranceAgriMer (http://www.franceagrimer.fr/filiere-peche-et-aquaculture) notes, it is the very production and marketing of eels that provides a vital means for the species survival: eel must be harvested from the wild in order to provide stock for growing facilities (which raise glass eels to maturity for release), but such harvests take place only if there is a market to provide harvesters a financial incentive. (Harvesters must divert a large portion of the catch to replenishment efforts.)

Table 43. European eel: Major export markets for EU Member States					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Germany	21.719	17.859	15.408	12.380	-43,0%
Netherlands	21.037	16.252	12.479	15.682	-25,5%
Italy	12.679	9.257	7.427	7.645	-39,7%
Belgium	4.992	5.393	4.975	5.360	7,4%
Spain	3.461	4.852	3.649	6.237	80,2%
Poland	3.901	3.445	4.142	5.229	34,0%
Denmark	5.886	4.162	2.469	1.878	-68,1%
United Kingdom	3.941	3.617	3.197	2.514	-36,2%
Subtotal	77.616	64.836	53.745	56.925	-26,7%
Other	15.052	13.336	10.802	8.112	-46,1%
World total	**92.668**	**78.172**	**64.547**	**65.037**	**-29,8%**

***Source**: Eurostat*

Table 44. European eel: Major export markets for EU Member States					
	2012	2013	2014	2015	2012-2015
	----------Volume in tonnes----------				
Netherlands	205	153	277	230	12.4%
Germany	455	465	489	429	-5.7%
Italy	152	105	106	162	7.0%
Belgium	71	54	52	51	-28.1%
Denmark	173	187	87	29	-83.2%
Spain	98	134	153	102	4.0%
Poland	126	102	234	221	76.3%
United Kingdom	53	96	338	52	-2.8%
Portugal	119	156	115	130	9.4%
Sweden	13	21	31	9	-29.8%
Subtotal	1.463	1.471	1.882	1.415	-3.3%
Other	520	401	371	254	-51.1%
World total	**1.983**	**1.872**	**2.252**	**1.669**	**-15.8%**

***Source**: Eurostat*

Globally, the market for EU eel exports appears to be shrinking. Total imports of EU-produced European eel declined from € 92,7 million in 2012 to € 65,0 million in 2015, a drop of almost 30 percent. This total includes relatively small markets for EU eel abroad, such as **Hong Kong, Japan, Turkey, Canada** and the **United States**. The leading markets within the EU for EU Member State exports fared only slightly better, declining by 27 percent during the four-year period.

Table 45. Eels: Baltic share of EU total imports (value)					
	2012	2013	2014	2015	2012-2015
EU imports from:	----------Value in € 1.000----------				
Estonia	347,0	417,3	316,4	439,9	26,8%
Latvia	127,4	88,9	91,6	83,6	-34,4%
Lithuania	51,7	2,2	18,6	5,1	-90,1%
Subtotal	526,2	508,4	426,6	528,7	0,5%
Total EU imports	**84.523,5**	**77.408,5**	**54.873,0**	**53.840,5**	-36,3%
Baltic share	0,6%	0,7%	0,8%	1,0%	

***Source**: Eurostat.*

The contribution of **Baltic eel exports** to the EU market is small but it is rising significantly, with market share doubling or tripling in recent years. In 2015, **Baltic exports** of 57,4 tonnes, valued at €528.700, equaled 1.4 percent of European imports by volume and 1.0 percent by value – sharp relative increases in both measures from 2012 levels.

Table 46. Eels: Baltic share of EU total imports (volume)

	2012	2013	2014	2015	2012-2015
EU imports from:	----------Volume in tonnes----------				(%)
Estonia	21,7	46,1	45,6	49,5	128,1%
Latvia	7,0	4,5	9,0	7,7	10,0%
Lithuania	3,1	0,1	1,8	0,2	-93,5%
Subtotal	31,8	50,7	56,4	57,4	80,5%
Total EU imports	**5.820,5**	**5.958,1**	**4.939,5**	**4.090,2**	-29,7%
Baltic share	0,5%	0,9%	1,1%	1,4%	

***Source**: Eurostat*

Table 47. Sample retail prices for eel products sold on-line in the United Kingdom

Product			Size	Price	Price/kg
Whole:	Skin on:				
	X SMALL	1 eel	140g	£8,00	£57,14
	SMALL	1 eel	260g	£14,80	£56,92
	MEDIUM	1 eel	480g	£27,40	£57,08
	LARGE	1 eel	640g	£36,50	£57,03
	X LARGE	1 eel	900g	£51,30	£57,00
	Skinless:				
	SMALL	1 eel	120g	£7,20	£60,00
	MEDIUM	1 eel	440g	£26,40	£60,00
	LARGE	1 eel	640g	£38,40	£60,00
	X LARGE	1 eel	1.060g	£74,20	£70,00
Pieces:	2xM FW eel stx (skinless)		180-300g	£13,90-23,10	£77,22-77,00
	2xL FW eel stx (on the bone) skin on		350-370g	£25,90	£70,00
	2xS FW eel stx (skinless)		270-410g	£20,80-31,60	£77,04-77,07
	2xM FW eel stx (on the bone) skin on		220-330g	£15,40-23,10	£70,00
Angula (elvers)	1 tin angulas		115g	£35,00	£304,35
	1 tin angulas (no outer box)		115g	£32,50	£282,61

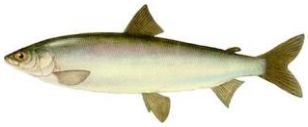
***Source**: https://www.thefishsociety.co.uk/suprafishlong/eel/ (data for Oct. 2017)*

Retail prices for eel products differ according to the size of the eel, with larger eels commanding higher per-kg prices. Eels sold on-line by a UK fishmonger show this clearly. One “extra small” skin-on eel retails for the equivalent of 57,14 €/kg, a “medium” eel retails for 57,08 €/kg, and an “extra large” eel sells for 57,00 €/kg. Eels sold “skinless” show a similar pattern of prices rising with animal size.

A comparison of eel prices in various retail stores in the main European markets showed that retail prices for eel products in EU supermarkets varied considerably by country and product form.[43] The most common product in stores is smoked eel, prices for which vary by eel size as well as by country. The highest prices were in **Denmark**, where prices for whole smoked eel were €59,07, and for smoked fillets, ranged from €107,25 to €126,13. In comparison, whole smoked eel in **Lithuania** was priced at €44,00, and in **Belgium** at €72,90. Smoked eel fillets in **Estonia** were priced at €46,52. Estonian stores also offered value-added products: eel prepared in jelly fell in a price range of €28,95-32,60, and marinated eel was priced at €39,40.

[43] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

European whitefish *(Coregonus lavaretus)*



Introduction

European whitefish, *Coregonus lavaretus*,[44] or the lavaret, is in a narrow sense considered to be native to Lake Bourget and Lake Aiguebelette in the Rhône river basin in France, whereas it formerly also occurred in Lake Geneva. According to this view there is a great number of distinct whitefish species in lakes, rivers and brackish waters of Central and Northern Europe.[45]

In a broader sense, European whitefish, *Coregonus lavaretus*, also referred to as the common whitefish, is widespread from central and northwest Europe to Siberia.[46] It encompasses many of the whitefish populations suggested by others to be locally restricted species (such as the British powan and the gwyniad or the Alpine gravenche), as well as distinct populations characterized by different feeding habits, gill raker numbers, growth patterns and migration behaviour.

It is a popular game fish throughout many parts of Europe, and is produced for commercial marketing by aquaculture in several countries. Like its salmonid cousins, *Coregonus lavaretus* is anadromous, and spends part of its adult life in saltwater.

Production

Aquaculture and inland fisheries production of European whitefish is almost exclusively undertaken by European countries. Total production grew from 2.283 tonnes in 2010 to a peak of 2.278 tonnes in 2012, before declining steadily to 2.623 tonnes by 2015. This "up-then-down" trend occurred in both the aquaculture and inland fisheries components of the whitefish sector.

The majority of European whitefish production (over 60 percent during 2010-2015) comes from harvests in inland fisheries. Such production reached 1.800 tonnes in 2015, up by 17 percent over 2012 production of 1.534 tonnes. **France** and **Finland** dominate European inland fisheries production, with 918 tonnes (51 percent) and 819 tonnes (46 percent), respectively, of total output in 2015. **Sweden** is the third largest producer, with just under one percent, followed by others.

[44] The term "whitefish" or "white fish" in many parts of the European seafood industry and markets frequently and confusingly refers to fish whose flesh is or nearly white, such as cod and other demersal species. This study focuses only on the actual species *Coregonus lavaretus.*
[45] "The IUCN Red List of Threatened Species: Coregonus lavaretus" (http://www.iucnredlist.org/details/5369/0).
[46] "Coregonus lavaretus, European whitefish" (http://www.fishbase.org/summary/Coregonus-lavaretus.html).

Table 48. European whitefish: EU aquaculture and fisheries production						
	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Inland fisheries						
France	660	700	738	839	917	918
Finland	812	812	670	670	819	819
Sweden	55	44	26	13	14	14
Other	7	11	15	13	13	49
Subtotal	**1.534**	**1.567**	**1.449**	**1.535**	**1.763**	**1.800**
Aquaculture						
Finland	723	1.211	1.240	1.155	856	818
Czech Republic	26	28	19	8	13	5
Other	0	0	0	0	0	0
Subtotal	**749**	**1.239**	**1.259**	**1.163**	**869**	**823**
Total	**2.283**	**2.806**	**2.708**	**2.698**	**2.632**	**2.623**

***Source**: Fishstat, FAO*

Aquaculture supplies the remaining 40 percent of European whitefish production. In this sector, **Finland** is the only reported producer of significance, with 98 percent of total European aquaculture production of this species during 2010-2015. The **Czech Republic** has the only other reported aquaculture production, averaging about two percent during 2010-2015. Industry sources report that other producers in the Baltic region and elsewhere also produce farmed whitefish, but their data do not appear in FAO statistics.

In addition to inland (freshwater) fisheries production, there also are significant quantities of European whitefish harvested in marine (saltwater) fisheries.

Table 49. European whitefish: EU marine fisheries production						
	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Finland	1.030	1.064	1.189	1.214	995	909
Sweden	130	126	139	114	143	152
Denmark	61	32	68	88	19	33
Other	53	72	84	87	54	84
Subtotal	1.274	1.294	1.480	1.503	1.211	1.178

***Source**: Fishstat, FAO*

Marine fisheries production of European whitefish totalled 1.178 tonnes in 2015, after declining from a peak of 1.503 tonnes in 2013. The Nordic countries of **Finland, Sweden**, and **Denmark** produce nearly all (95 percent) of the total supply of European whitefish from marine waters.

Trade

International trade in European whitefish has historically been too low to record exports or imports in national or EU trade statistics. Instead, this species is included in a basket "all other" category with many other finfish species in the EU Combined Nomenclature (CN) system of the Common Customs Tariff Schedule, under CN headings 0302, 0303, and 0304.

EU Combined Nomenclature: Provisions for European whitefish

0302, 0303	Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all freshwater fish*):
0302 89 10	Fresh or chilled fish, excluding fillets and other fish meat, Other
0303 89 10	Frozen fish, excluding fillets and other fish meat, Other
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all freshwater fish*):
0304 49 10	Fresh or chilled fillets and other fish meat, Other
0304 89 10	Frozen fillets and other fish meat, Other

While there are no official statistics on EU trade in European whitefish, a number of industry sources have indicated that producers of aquaculture and fisheries produced whitefish engage in export activity, mainly to other EU markets.

Market

European whitefish, *Coregonus lavaretus*, as its name implies, is marketed in competition with, other species of whitefish ranging from hake to pangasius in European markets. These various products share a number of market characteristics, including common market channels, positions on the middle to low end of the price spectrum for seafood products, and widespread appeal among seafood consumers.

The large number of similar species means the possibilities for substitution between European whitefish and competing species is high. As a result, pressure on prices is high as well. In some markets where the main competitors are species such as sea bream and sea bass, prices can be higher, but the costs of marketing and promotion are high as well.

Competiton in the market for European whitefish is likely to remain high, because consumer demand remains strong and because supplies of competing species are steady (as with hake, for example) or increasing (as with sea bass and bream). Some of these species, such as Alaska pollock, come with MSC certification labels, which adds a price premium in markets where consumers are concerned about sustainability of fisheries. The degree of rivalry is not expected to decrease in the near future, because both the demand for whitefish and the level of competitiveness between the different species are set to remain high. Rivalry is coming not only from outside Europe, but also from countries such as Greece, where the production of cultured whitefish has developed rapidly.[47]

A comparison of prices was made in retail outlets in the EU in search of European whitefish, among other freshwater species.[48] True European whitefish is not often found in supermarkets.[49] However, a number of true European whitefish products were located in **Estonia**, and their observed prices were as follows: low-salted whitefish fillets (€49,89), salted whitefish with dill, sliced (€33,90), whitefish slices with delicate salt (€8,10), hot-smoked whitefish (€9,90), and whitefish caviar (€61,50).

[47] Additional market advice is provided in: "What competition do you face on the European frozen white fish market?" (https://www.cbi.eu/market-information/fish-seafood/frozen-white-fish-products/competition/).

[48] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

[49] True European whitefish is distinguished from various species commonly called "whitefish" such as cod, pangasius, and others.

Freshwater shrimps *(Macrobrachium rosenbergii, Macrobrachium nipponense)*

Macrobrachium rosenbergii

Macrobrachium nipponense3

Introduction

Freshwater shrimps are prawns, usually quite large, that are found mainly in tropical or temperate climates. The primary species of commercial importance is the giant river prawn (*Macrobrachium rosenbergii*), which can reach 30cm in length and is found in the wild in the waters of Africa, Thailand, China, Bangladesh, Japan, New Zealand, and the Caribbean.

Production

Freshwater shrimps are tropical species and more than 99 percent of global production takes place in aquaculture facilities in tropical regions of Asia. Trace amounts are produced in RAS facilities in Europe, in quantities too small to be reported by FAO on a country-specific basis. (The numbers are business confidential information.)

Table 50. Freshwater shrimp: Global aquaculture production

	2010	2011	2012	2013	2014	2015
Species	----------Volume in tonnes----------					
Oriental river prawn						
China	225.645	230.248	237.431	251.149	257.641	265.061
Other	0	0	0	0	0	0
Subtotal	225.645	230.248	237.431	251.149	257.641	265.061
Giant river prawn						
China	125.203	122.933	124.713	117.402	127.204	129.452
Bangladesh	30.636	39.868	45.162	43.713	45.167	42.053
Thailand	25.606	21.080	18.702	18.168	16.906	16.218
Other	16.094	18.197	22.515	23.723	26.603	26.220
Subtotal	**197.539**	**202.078**	**211.092**	**203.006**	**215.881**	**213.943**
Total	**423.184**	**423.326**	**448.523**	**454.155**	**473.522**	**479.004**

***Source**: Fishstat, FAO*

Global aquaculture production of freshwater shrimp totalled 479.004 tonnes in 2015, a steady increase from 423.184 tonnes produced in 2010. Anuual totals are split almost 50-50 between oriental river prawn and giant river prawn. For both species, **China** is the dominant producer, with more than 80 percent of total aquaculture production of both species. **Bangladesh** and **Thailand** are second and third in the production of giant river prawn.

Table 51. Freshwater shrimp: Global inland fishery production

	2010	2011	2012	2013	2014	2015
Species	----------Volume in tonnes----------					
Oriental river prawn						
China	144,7	137,7	141,3	142,5	137,7	129,2
Other	0	0	0	0	0	0
Subtotal	**144,7**	**137,7**	**141,3**	**142,5**	**137,7**	**129,2**
Giant river prawn						
Indonesia	9,4	9,5	9,3	10,4	11,8	13,3
Philippines	1,4	1,6	1,5	1,7	1,7	1,5
Other	0	0	0	0	0	0
Subtotal	**10,8**	**11,1**	**10,8**	**12,1**	**13,5**	**14,8**
Total	**155,5**	**148,8**	**152,1**	**154,6**	**151,2**	**144,0**

***Source**: Fishstat, FAO*

Small, and generally declining, quantities of freshwater shrimps are harvested in inland fisheries. Such production declined from 155,5 tonnes in 2010 to 144,0 tonnes in 2015. Oriental river prawn is the dominant species produced in this method, and China is by far the largest producer. EU production of freshwater shrimps is exclusively from aquaculture, and increased irregularly from 174 tonnes in 2010 to 278 tonnes in 2015.

Table 52. Freshwater shrimp: EU production (all species)

	2010	2011	2012	2013	2014	2015
Production method	----------Volume in tonnes----------					
Aquaculture	174	218	216	141	236	278
Inland fishery	0	0	0	0	0	0
Total	**174**	**218**	**216**	**141**	**236**	**278**

***Source**: Fishstat, FAO*

Trade

World trade has historically been too low to record exports of freshwater shrimps in official trade statistics. Rather, freshwater shrimps are included in the following basket categories for "all other" shrimps and prawns under the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule, heading 0306.

EU Combined Nomenclature: Provisions for freshwater shrimps

0306	Crustaceans, fresh, chilled or frozen
	Shrimps and prawns, other than cold-water shrimps and prawns and shrimps of the species *Parapenaeus longirostris* and the genii *Penaeus* or *Crangon*:
0306 17 99	Frozen
0306 95 90	Live, fresh or chilled

Freshwater shrimps are tropical shellfish and therefore has been no EU-produced product for export.

Market

Freshwater shrimps are large prawns and enter diferent market channels than most shrimps consumed in the EU, which are smaller warm- or cold-water shrimps, which compete only remotely with giant prawns in the EU marketplace.

Nevertheless, some insights into giant prawn markets can perhaps be obtained from experiences in markets for other smaller shrimps. Concerns about food safety, sustainability and supply chain transparency are very important issues for European shrimp buyers. To secure safe and sustainable supply of shrimp products, European buyers are shortening the length of their supply chains and investing in long-term relationships.[50]

The shrimp farming sector, particularly in Asia, has received negative comments from Europe's media. The sector has been criticised for its negative impact on communities (such as child labour) and the environment (such as pollution of groundwater and agricultural land). As a result, consumers' awareness of the negative social and environmental impact of shrimp farming is increasing. European buyers are therefore seeking out shrimp suppliers that are able to prove the sustainability and responsibility of their product.

Many years ago, there were large differences in buyer requirements throughout the European Union. More recently, the European market is reportedly becoming more uniform, partly because of more stringent European Union regulations, and the fact that retailers throughout Europe increasingly apply the same buyer requirements. However, there remain differences between markets in North and Western Europe and Central and Southern Europe.

The demand for ready-to-eat and easy-to-cook, value-added shrimp products reportedly is increasing, in line with the general increase in demand for convenience food. Added to this is the perception that many consumers do not know how to prepare shrimp. Thus simple value-adding activities such as peeling and portioning are outsourced to processors in developing countries before selling shrimp products in Europe. Some industry experts believe that, as a result of price pressure, more complex value-adding activities will be outsourced in the long term, such as the production of marinated shrimp.

In recent years certification trademarks have become common in the marketing of shrimp as well as other seafood. This is especially true in the case of large supermarket chains which frequently require certificates such as GlobalG.A.P. and Aquaculture Stewardship Council (ASC). Such certificates are a means to address the growing consumer attention paid to food safety, sustainability and responsible sourcing.

[50] https://www.cbi.eu/node/1863/pdf/

North African catfish *(Clarias gariepinus)*

Introduction

North African catfish *(Clarias gariepinus*), also known as sharptooth catfish, is a large (1-1.5 m, 50-60 kg) freshwater foodfish native to Africa but also found in the wild in parts of the Middle East and Eastern Europe. It has also been introduced for aquaculture in other countries around the world.[51]

North African catfish has been associated with traditional capture-based aquaculture and inland fisheries for centuries, and has almost pan-African distribution[52]. The species is generally considered an easy-to farm-species with high nutrition, good flavour and ready consumer acceptance.

Production

In 2015, the global aquaculture production of North African catfish reached nearly 246.000 tonnes, of which 97% was produced outside of Europe. Nigeria is the world's largest producer of farmed North African catfish with over 160.000 tonnes in 2015, increasing its output by 39% since 2010. Uganda is the next largest producer of the species with nearly 60.000 tonnes in 2015.

Figure 4: Aquaculture production of North African catfish

Source: FishstatPLUS, FAO

Table 53: Extra-European aquaculture production of North African catfish (tonnes)						
	2010	2011	2012	2013	2014	2015
Total	**191.024**	**193.989**	**186.172**	**218.062**	**233.909**	**238.505**
Nigeria	115.421	122.681	125.762	149.980	158.531	160.295
Uganda	63.000	57.300	43.586	49.491	57.626	59.914
Cuba	5.278	5.181	6.347	6.758	6.868	6.800
Other	7.325	8.827	10.477	11.833	10.884	11.496

***Source**: Fishstat, FAO*

[51] " North African catfish," Aquaculture Feed and Fertilizer Resources Information System, FAO (http://www.fao.org/fishery/affris/species-profiles/north-african-catfish/north-african-catfish-home/en/).
[52] Cultured Aquatic Species Information Programme, FAO.

In Europe, North African catfish was introduced in the Netherlands in 1976, when the first brood stock was transferred from the Central African Republic. Commercial farming of this species started in recirculation aquaculture systems in 1985. Later, catfish strains from Israel and the Republic of South Africa were introduced, and these strains were crossed for the production of fingerlings, resulting in the currently cultured "Dutch strain" African catfish.[53]

In 2015, European aquaculture production of North African catfish reached 7.250 tonnes. In warm climate, catfish farming is becoming more intensive and in cooler climates catfish are farmed in recirculation systems.

The Netherlands and Hungary are the largest producing countries with an output of almost 2.900 tonnes each in 2015. However, production trends of those countries went in different directions during 2010-2015: while the farmed output of North African catfish from Dutch farms decreased 9% mostly due to adverse climate conditions, Hungarian farmers increased output by 57% due to investment in geothermal water heated intensive systems, and now African catfish is the dominant fish in intensive fish farming in Hungary. Farming of the species is also on the rise in Germany where it exceeded 1.000 tonnes in 2015 from less than 300 tonnes in 2010, in part due to use of intensive systems. **Lithuanian** production of North African catfish has been rapidly expanding from 13 tonnes in 2012 up to 134 tonnes in 2015. Production is also increasing in **Latvia** where nearly 84 tonnes were farmed in 2015.

Table 54: European aquaculture production of North African catfish (tonnes)

	2010	2011	2012	2013	2014	2015
Total	**5.948**	**4.048**	**3.947**	**6.177**	**6.371**	**7.246**
Netherlands	3.200	1.620	1.200	3.100	2.900	2.900
Hungary	1.810	1.913	1.852	2.050	2.187	2.840
Germany	285	319	430	695	876	1 072
Other	651	196	465	332	408	434

***Source**: Fishstat, FAO*

FEAP, which provides statistics from its members (i.e., national aquaculture associations), reports somewhat different data on European production of North African catfish. From that source, such production totalled 6.285 tonnes in 2015, up from 5.252 tonnes in 2012.

Table 55. African catfish: European production (tonnes)

	2012	2013	2014	2015	2012-2015
Producer:					
Netherlands	3.000	3.100	3.100	3.100	3,3%
Hungary	1.852	2.050	2.000	2.685	45,0%
Poland	400	400	500	500	25,0%
Total	**5.252**	**5.550**	**5.600**	**6.285**	**19,7%**

***Source**: Federation of European Aquaculture Producers*

In addition to aquaculture production, inland "wild-caught" fish represents a significant volume in the global supply of North African catfish. In 2015, total inland fisheries volume of the species reached

[53] "Introduction to African Catfish hatchery set up and management," Fleuren & Nooijen (http://www.africancatfish.com/).

almost 53.200 tonnes, mostly coming from Nigeria (21.850 tonnes), Mali (21.500 tonnes) and Ethiopia (7.200 tonnes). There are no commercial inland fisheries of this species in Europe.

Trade

North African catfish is grouped with other catfish species in international trade data reported under the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members). Catfish trade data are reported under CN headings 0302, 0303, and 0304.

EU Combined Nomenclature: Provisions for North African and Wels catfish

0302, 0303 Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all catfish of the species Pangasius spp., Silurus spp., Clarias spp., and Ictalurus spp.*):
0302 72 00 Fresh or chilled
0303 24 00 Frozen

0304 Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all freshwater fish*):
0304 32 00 Fresh or chilled
0304 62 00 Frozen

Table 56. Catfish: EU exports, by product form

EU exports		2012	2013	2014	2015	2012-2015
Value (€ 1000s)	Fresh/chilled	29.301	27.053	20.694	20.880	-28,7%
	Frozen	66.400	52.393	48.009	47.027	-29,2%
	Total	95.701	79.447	68.702	67.907	-29,0%
Quantity (tonnes)	Fresh/chilled	10.981	6.051	6.674	4.153	-62,2%
	Frozen	25.630	21.930	20.461	19.188	-25,1%
	Total	36.612	27.981	27.135	23.341	-36,2%
Unit value (€/kg)	Fresh/chilled	2,67	4,47	3,10	5,03	88,4%
	Frozen	2,59	2,39	2,35	2,45	-5,4%
	Average	2,61	2,84	2,53	2,91	11,3%

***Source**: Eurostat*

Exports of catfish by EU Member States (all species, including North African and Wels catfish along with the dominant species pangasius) totalled 23.341 tonnes, valued at € 67.9 million, in 2015. As with imports, these exports steadily declined in volume since 2012, when such exports totalled 36.612 tonnes, valued at € 95.7 million. Almost all exports by EU countries (90-95 percent) are shipped to other EU countries, while the remaining 5-10 percent are destined for markets beyond EU borders (non-EU European markets, the Americas, etc.)

Table 57. Catfish exports by major EU exporters					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Netherlands	33.702	28.114	27.702	30.090	-11%
Germany	12.065	12.214	7.978	8.826	-27%
Belgium	5.380	7.001	9.415	11.434	113%
Denmark	3.601	4.218	4.981	5.551	54%
Spain	4.162	3.349	1.869	2.047	-51%
Subtotal	58.910	54.896	51.945	57.948	-2%
Total EU exports	**95.701**	**79.447**	**68.702**	**67.907**	-29%
Subtotal share	61,6%	69,1%	75,6%	85,3%	

***Source**: Eurostat*

The leading EU exporters are (in declining order of export value): the **Netherlands, Germany, Belgium, Denmark**, and **Spain**. Together, these countries accounted for almost 20 percent of total EU exports from all sources during 2012-2015.[54]

There was no common trend in exports by the leading countries during 2012-2015, and as a result total exports by this group showed little change during the period.

Table 58. Catfish: Intra-EU and global trade by EU Member States							
	Imports (in € 1.000)				Exports (in € 1.000)		
	Total	Intra-EU	% intra		Total	Intra-EU	% intra
2012	385.727,5	75.230,1	19,5%		95.701,3	92.435,0	96,6%
2013	330.495,8	71.221,1	21,5%		79.446,8	77.452,8	97,5%
2014	307.258,1	67.043,6	21,8%		68.702,3	64.728,3	94,2%
2015	326.143,8	72.176,8	22,1%		67.907,1	64.544,0	95,0%

***Source**: Eurostat*

There is a significant difference between EU catfish trade in total versus internal (intra-EU) trade between Member States. About 20 percent of EU Member State imports of catfish come from other Member States, while almost all exports by EU Member States are shipped to other Member States.

By product form, the majority (95-98%) of EU catfish imports enter by filleted form rather than whole (round) form. This suggests possibly a shortage of EU processing capacity, even considering that many traditional consumers prefer to buy whole (or round/dressed) fish. However, the share of fillets in the total import supply is rising somewhat, perhaps due to preferences among younger consumers for more convenient fillets.

Shares of total EU catfish trade by the Baltic Sea region countries of **Estonia, Latvia** and **Lithuania** declined slightly during 2012-2015, due to reductions in both exports and imports. Total catfish **exports** from the Baltic countries to other EU Member States dropped by 35.5 percent during 2012-2015, from

[54] The Netherlands, home to Europe's largest port, Rotterdam, tends to be overrepresented in data on EU trade with the world because much of Europe's trade goes through this country. However, it is not possible to determine exactly how much of the Netherlands imports stay in the Netherlands or how much of its exports originate in that country.

€ 2.2 million to € 1.4 million. As a share of total imports by other EU Member States, supplies from Baltic countries fell from 0.6 percent to 0.4 percent in 2012-2015.

Table 59. Catfish: Baltic countries' shares of EU trade

	2012	2013	2014	2015	2012-2015
Baltic exports to EU	----------**Value in € 1.000**----------				
Estonia	377.954	372.231	355.567	536.483	41.9%
Latvia	626.970	691.205	571.961	419.482	-33.1%
Lithuania	1.204.150	1.168.221	544.233	468.243	-61.1%
Subtotal	**2.209.074**	**2.231.657**	**1.471.761**	**1.424.208**	**-35.5%**
Share of EU imports	0.6%	0.7%	0.5%	0.4%	
Baltic imports from EU	----------**Value in € 1.000**----------				
Estonia	2.120	2.300	2.140	2.822	33.1%
Latvia	2.815	2.798	2.494	1.563	-44.5%
Lithuania	4.490	5.301	2.791	2.174	-51.6%
Subtotal	**9.425**	**10.399**	**7.425**	**6.559**	**-30.4%**
Share of EU exports	0.01%	0.01%	0.01%	0.01%	

***Source**: Eurostat*

Total **imports** into the subject Baltic countries from other EU Member States dropped by 30 percent during the same period, from € 9.4 million in 2012 to € 6.6 million in 2015. As a share of total EU exports to the world, Baltic imports from other EU States fluctuated between about 10 percent and 13 percent during 2012-2015.

Market

Several "new" catfish varieties, such as Asia's pangasius, have found a weak welcome in European markets, and African catfish, introduced in the 1980s, is no exception. However, in recent years European farmed production has grown significantly, even if volumes are small compared with other catfish species, and prices at the ex-farm level have stabilized after a short period of volatility.

African catfish is slightly darker in colour than whiter catfish of other species, which may explain part of consumer hesitation. Its main competing species in the marketplace probably are not other whitefish such as cod, but other freshwater fish such as trout. Trout has enjoyed tremendous success in European markets, so it is likely there is a continued place for African catfish as well, particularly as North African catfish prices tend to be lower than farmed trout prices.

Table 60. Catfish: EU imports, by product form						
EU imports		**2012**	**2013**	**2014**	**2015**	**2012-2015**
Value	Fresh/chilled	40.720	32.150	26.912	25.996	-36,2%
(€ 1.000)	Frozen	345.007	298.346	280.346	300.148	-13,0%
	Total	**385.728**	**330.496**	**307.258**	**326.144**	**-15,4%**
Volume	Fresh/chilled	12.917	8.672	7.193	6.838	-47,1%
(tonnes)	Frozen	163.866	164.052	149.045	131.570	-19,7%
	Total	**176.783**	**172.724**	**156.238**	**138.408**	**-21,7%**
Unit value	Fresh/chilled	3,15	3,71	3,74	3,80	20,6%
(€/kg)	Frozen	2,11	1,82	1,88	2,28	8,4%
	Average	**2,18**	**1,91**	**1,97**	**2,36**	**8,0%**

***Source**: Eurostat*

EU Member State imports of catfish (all species, including North African catfish, which is not specifically broken out separately) totalled 138,4 thousand tonnes, valued at € 326.1 million, in 2015. This followed a steady decline in import volume since 2012, when such imports totalled 176,8 thousand tonnes, valued at € 385.7 million. Most imports by EU countries (about 80 percent) come from outside the EU, with the remaining 20 percent representing intra-EU trade (including trade in catfish originally imported from elsewhere in the world).

Table 61. Catfish imports by major EU importers					
	2012	**2013**	**2014**	**2015**	**2012-2015**
	----------Value (€ 1000s)----------				
Netherlands	12.480	11.575	11.218	11.419	-9%
Germany	14.137	11.272	8.472	8.118	-43%
France	11.437	9.032	7.938	8.018	-30%
Spain	5.162	5.328	5.769	8.142	58%
Austria	7.119	4.945	3.409	3.068	-57%
Subtotal	50.335	42.152	36.805	38.765	-23%
Total EU imports	**385.728**	**330.496**	**307.258**	**326.144**	-15%
Subtotal share	13.0%	12.8%	12.0%	11.9%	

***Source**: Eurostat*

Among the largest EU countries in catfish trade, the leading importers are (in declining order of import value): the **Netherlands, Germany, France, Spain,** and **Austria**. Together, these countries accounted for 53-57 percent of total value of EU imports from all sources during 2012-2015. Total imports by these countries fell by 23 percent during 2012-2015, broadly in line with total EU import trends (which were down by 15 percent), although import markets in Germany and Austria fell much more sharply.

By **product form**, the majority (95-98%) of EU catfish imports are shipped in filleted form rather than whole or round (beheaded and eviscerated) form. This might suggest a shortage of processing capacity in the main market areas, even considering that many traditional consumers prefer to buy whole (or round) fish. However, as a share of total costs the cost of transport is lower for higher-value product, and that would explain the predominance of fillets in trade. Further, the share of fillets in the total import supply is rising somewhat, perhaps due to preferences among younger consumers in growing markets for more convenient fillets.

There are some possible events observed at the **country level**. In some countries catfish processing activity is clearly increasing: in Hungary, for example, which is a large producing and consuming country rather than a trader, the proportion of its catfish exports that are filleted rather than marketed whole nearly doubled between 2012 (36% of total exports were fillets) and 2015 (68% of total exports). (Hungary's catfish imports remain almost exclusively filleted fish, so its whole fish exports must be domestically produced.) In Germany, a much larger importer, exporter and processor of catfish than Hungary, the proportion rose from 83% of exports consisting of fillets in 2012 to 97% in 2015. On Germany's import side, its share of imports consisting of fillets fell from 92% in 2013 to 88% in 2015, suggesting its industry is importing relatively more whole fish to process into fillets. The apparent presence (or absence) of processing activity in some countries might be of interest to potential marketers of catfish to those countries to determine which product form is in demand.

European producers of farmed catfish have developed two **geographic markets** for their product, in the fish's origins in Africa, and in Europe. EU exports to Africa of frozen catfish fillets, by far the most important product form, doubled from 1.735 tonnes in 2012 to 3.251 tonnes in 2014, before dropping back somewhat to 2.575 tonnes in 2015. In addition, there reportedly are shipments of catfish larvae and fingerlings from Europe to African aquaculture facilities, but there are no exact figures on this trade. Industry sources report continued growth in African demand for fingerlings from the EU as Africa's catfish aquaculture sector continues to grow.

In calculating EU apparent consumption of catfish, production data are available for North African catfish only, while import and export data necessarily include all catfish species. Apparent consumption declined steadily from 1.513 tonnes in 2012 to 1.147,8 tonnes in 2015. This decline occurred despite a large increase in production and an (irregular) decline in exports, both of which would add to intra-EU supply. However, imports declined (an additional element in reduced supply) steadily during 2012-2015, resulting in the drop in apparent consumption.

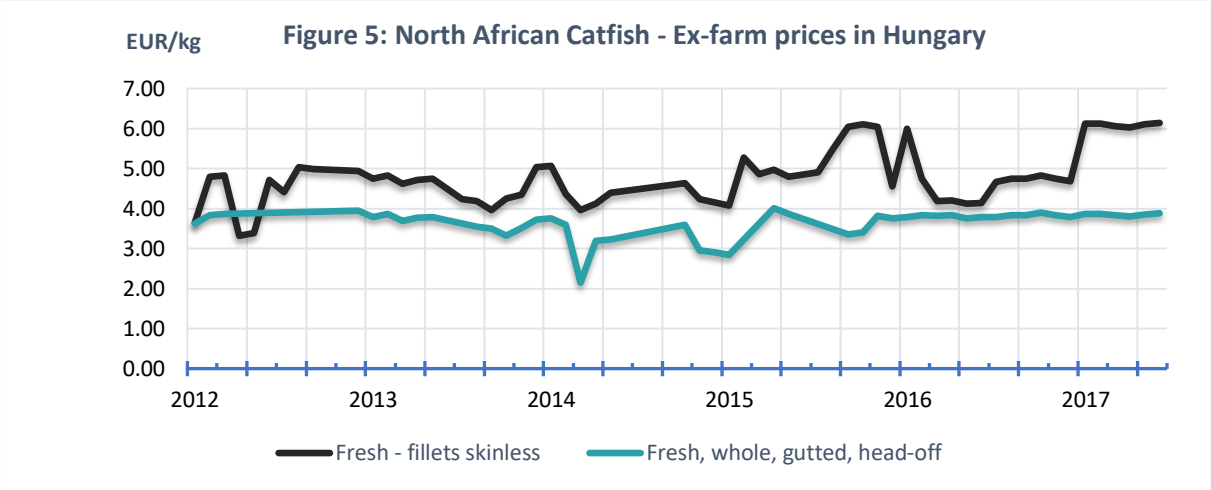
Despite the rising trend in EU catfish exports to Africa (in the face of declining exports to the world in general), average unit values of EU catfish exports to Africa (243 €/tonne in 2015) are lower than those for all EU catfish exports to all destinations (503 €/tonne in 2015). That is because the total for all destinations includes a higher share of catfish species other than North African catfish (such as the higher-priced pangasius), which pulls the average price higher than for catfish exported to Africa. Unfortunately, most published export data do not allow distinction between North African and other species of catfish.

In the central Africa region, namely in Cameroon, Gabon or the Democratic Republic of Congo, African catfish is very popular, being cooked in many forms of soups, made of some forest seeds with specific tastes and nutritional properties. The fresh fish are usually sold live in the markets of major cities at an average size of 500 g for 3,3-5,2 USD/kg. In Nigeria, the current selling price for North African catfish averages 3,5 USD/kg.

In south-eastern Africa, catfish prices are a little lower than those for tilapia. In the South African market, African catfish has not met with strong consumer demand. In part this appears to be due to religious aversion by some consumers (who do not eat fish without scales), while others reject the fish due to its slightly darker flesh compared to other catfish such as pangasius.

Prices of processed North African catfish in Europe have been rising in recent years. Taking **Hungary** as an example, catfish fillet prices, although volatile, have shown a clear long-run increase since 2012. This

contrasts interestingly with ex-farm (whole fish) prices, which despite a volatile period in 2014-2015, are no different in 2016-2017 than they were in 2012-2013. Thus the marketing margin (the gap between input and output price) for processors has grown. This may reflect rising processing costs (fish feed, labour, energy, etc,).



***Source**: European Price Report, Globefish, FAO.*

Analysing development of ex-farm prices of North African catfish in Hungary, the first half of 2017 brought highest prices for the species after a period of lower prices during 2016 due to the higher demand for this freshwater species on the market. This trend is especially noticeable for value-added products such as fresh skinless fillets (6,14 €/kg in June 2017), while prices for fresh whole North African catfish were more stable (3,88 €/kg).

A comparison of catfish prices in various retail stores in the main European markets showed that retail prices for catfish products in EU supermarkets varied considerably by country and product form.[55] Some of the highest prices were found in **Denmark**, with fresh skinned fillets in the €21,11-29,57 range, and other fresh fillets in the €30,79-43,00 range. Fresh fillets of African catfish were priced at €10,07 in **Bulgaria**, and prepared African catfish (either in marinade or smoked or in tomato sauce) were priced in the €21,17-27,19 range in **Estonia**. Also in Estonia, marinated catfish of unspecified species was priced at €22,76. In **Lithuania**, fresh cleaned catfish was priced in the €8,09-9,86 range depending on size, smoked whole catfish was €10,49, and smoked fillets at €31,19, while catfish of unspecified cut, roasted with mint and rosemary was priced at €19,96.

[55] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

Wels catfish *(Silurus glanis)*

(Silurus glanis)

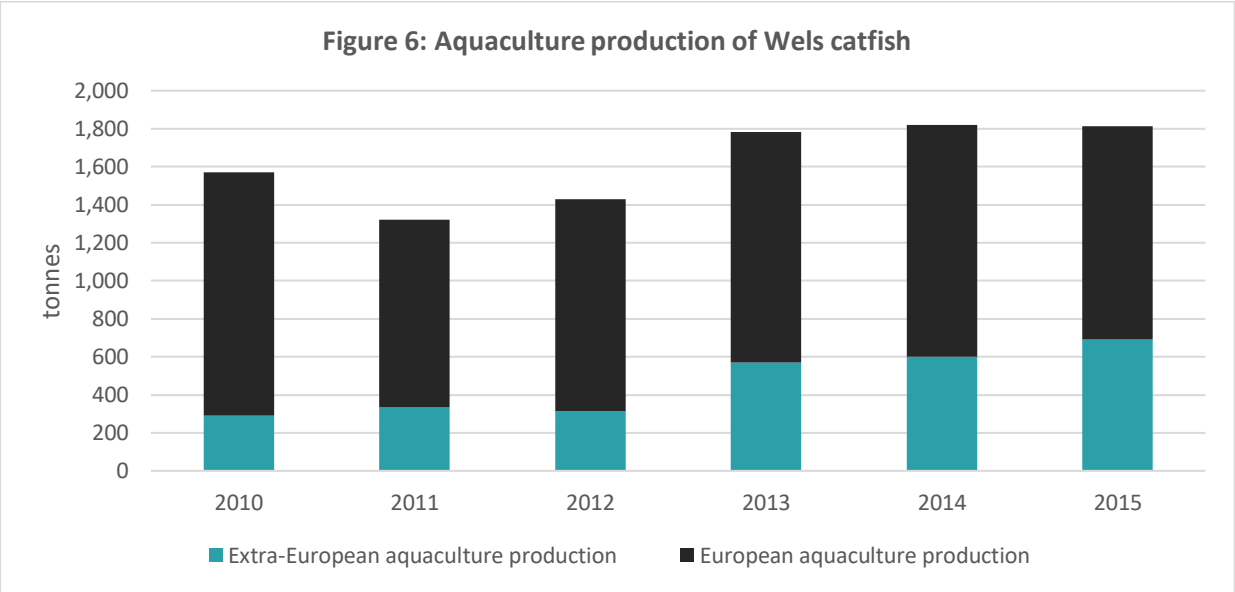
Introduction

Wels, or European, catfish (*Silurus glanis*) is a large species native to wide areas of Eastern Europe, in the basins of the Baltic, Black, and Caspian Seas. It is primarily a sportfish, although in recent years aquaculture production of Wels catfish has emerged as a source of food supply.

Production

Wels catfish is one of the world's largest freshwater fish and is the largest freshwater fish in Europe. The species originates from the eastern countries in Europe, and now can be found throughout Europe and into Asia. The meat of Wels catfish has sweet taste and bones and scales structure, and its capacity for growth is amongst the highest of any fish.

World aquaculture production of Wels catfish as reported by FAO has been stable since 2013. Most production takes place in EU countries, although output from extra- or non-EU sources has been growing.



***Source**: FishstatPLUS, FAO*

Compared with North African catfish, production of Wels catfish is modest. In 2015, aquaculture production of Wels catfish in non-European countries grew to 700 tonnes, where over half of this

production volume was supplied from **Uzbekistan**. In the past decade, Wels catfish farms were operating in **Moldova, Ukraine, Russia** and other post-Soviet Republics.

Table 62. Wels catfish: European and extra-European production (tonnes)							
	2010	2011	2012	2013	2014	2015	2010-2015
European production	----------Volume in tonnes----------						
Poland	200	220	274	328	426	220	10,0%
France	200	200	200	200	200	200	0,0%
Germany	217	203	198	158	163	190	-12,4%
Other	663	365	444	526	429	512	-22,8%
Subtotal	**1.280**	**988**	**1.116**	**1.212**	**1.218**	**1.122**	**-12,3%**
Extra-European production							
Uzbekistan	10	59	150	379	347	412	4.020,0%
Moldova	100	100	100	100	100	100	0,0%
Ukraine	1	0	0	0	78	87	8.600,0%
Other	191	176	63	92	76	93	-51,3%
Subtotal	**292**	**335**	**313**	**571**	**601**	**692**	**137,0%**
Total	**1.572**	**1.323**	**1.429**	**1.783**	**1.819**	**1.814**	**15,4%**

***Source**: Fishstat, FAO*

In Europe, farming of Wels catfish has been stable at just over 1.000 tonnes, according to FAO. **Poland, France** and **Germany** are the largest producing countries of Wels catfish with an annual farmed output of approximately 200 tonnes. Another source provides slightly different data. FEAP reports that European production of Wels catfish grew from 1.306 tonnes in 2012 to 1.478 tonnes in 2014, before dropping sharply to 1.110 tonnes in 2015.[56] Italy and Hungary were primarily responsible for the decline.

Production of Wels catfish has been increasing in **Lithuania**, where local farms produced 6,6 tonnes of the species in 2015, increasing from 700kg in 2009. In **Latvia**, Wels catfish has also been farmed, with production of 100 kg in 2015.

Table 63. Wels catfish: European production (tonnes)					
	2012	2013	2014	2015	2012-2015
Producer:	----------Volume in tonnes----------				
Italy	550	600	600	300	-45,5%
Austria	262	290	354	354	35,1%
Poland	219	250	250	250	14,2%
Hungary	225	212	220	143	-36,4%
Czech Republic	50	61	54	63	26,0%
Total	**1.306**	**1.413**	**1.478**	**1.110**	**-15,0%**

***Source**: Federation of European Aquaculture Producers*

[56] Federation of European Aquaculture Producers, "European Aquaculture Production Report, 2007-2015." Available at http://www.feap.info/.

The supply of wild-caught Wels catfish far exceeds aquaculture production. In 2015, the volume of the species from the inland fisheries in Extra-EU countries exceeded 10.000 tonnes, where over 70% was supplied from the **Russian** rivers. Inland catches of Wels catfish in **Kazakhstan** and **Turkey** were 1.500 and 550 tonnes, respectively.

Table 64. Wels catfish: European and extra-European inland fisheries production (tonnes)							
	2010	2011	2012	2013	2014	2015	2010-2015
European production	----------Volume in tonnes----------						
Romania	131	132	160	188	215	240	83,2%
Hungary	170	179	198	180	124	203	19,4%
Czech Republic	93	97	105	97	112	126	35,5%
Other	152	163	301	173	171	180	18,4%
Subtotal	546	571	764	638	622	749	37,2%
Extra-European production							
Russia	10.980	7.051	7.993	7.380	7.393	7.326	-33,3%
Kazakhstan	2.429	2.045	1.566	1.694	1.300	1.487	-38,8%
Turkey	1.178	946	816	618	629	549	-53,4%
Other	517	572	597	651	1.198	954	84,5%
Subtotal	15.104	10.614	10.972	10.343	10.520	10.316	-31,7%
Total	**15.650**	**11.185**	**11.736**	**10.981**	**11.142**	**11.065**	**-29,3%**

***Source**: Fishstat, FAO*

Trade

Wels catfish are grouped with other catfish species in international trade data, and therefore the earlier discussion of catfish trade relating to North African catfish production and markets applies equally to Wels catfish. In summary, exports of catfish by EU Member States (all species, including Wels catfish) totalled 23.341 tonnes, valued at € 67,9 million, in 2015. As with imports, these exports steadily declined in volume since 2012, when such exports totalled 36.612 tonnes, valued at € 95.7 million. Almost all exports by EU countries (90-95 percent) are shipped to other EU countries, while the remaining 5-10 percent are destined for markets beyond EU borders (non-EU European markets, the Americas, etc.)

The leading EU exporters are (in declining order of export value): the **Netherlands, Germany, Belgium, Denmark**, and **Spain**. Together, these countries accounted for almost 20 percent of total EU exports from all sources during 2012-2015.[57]

By product form, the majority (95-98%) of EU catfish imports enter by filleted form rather than whole (round) form. The share of fillets in the total import supply is rising somewhat, perhaps due to preferences among younger consumers for more convenient fillets.

Shares of total EU catfish trade by the Baltic countries of **Estonia, Latvia** and **Lithuania** declined slightly during 2012-2015, due to reductions in both exports and imports. Total catfish **exports** from the Baltic countries to other EU Member States dropped by 35.5 percent during 2012-2015, from € 2.2 million to € 1.4 million. As a share of total imports by other EU Member States, supplies from Baltic countries fell from 0.6 percent to 0.4 percent in 2012-2015.

[57] The Netherlands, home to Europe's largest port, Rotterdam, tends to be overrepresented in data on EU trade with the world because much of Europe's trade goes through this country. However, it is not possible to determine exactly how much of the Netherlands imports stay in the Netherlands or how much of its exports originate in that country.

Total **imports** into the subject Baltic countries from other EU Member States dropped by 30 percent during the same period, from € 9.4 million in 2012 to € 6.6 million in 2015. As a share of total EU exports to the world, Baltic imports from other EU States fluctuated between about 10 percent and 13 percent during 2012-2015.

Market

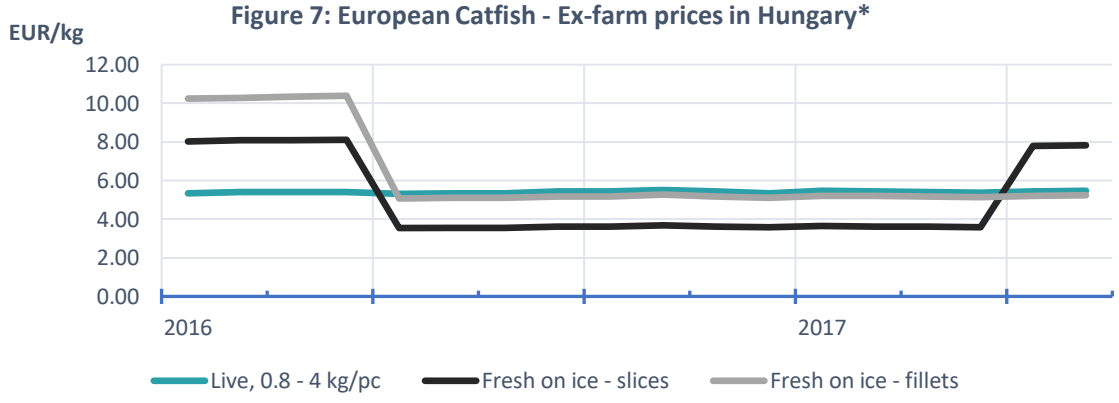
Relatively little value-addition has been applied in marketing of Wels catfish, and the species is mostly sold in traditional forms in its core markets as live, fresh whole, fresh in pieces and fresh fillets.

Picture 3: Various Wels catfish products in a German fishmonger store (from left to right: smoked fillets, fresh fillets and deep frozen fillets)

***Source**: https://www.fischkaufhaus.de/*

Comparative analysis of Wels catfish ex-farm prices in **Hungary** reveals that in May- June 2017, the highest price at 7,84 €/kg was noted for fresh Wels catfish slices, while in the previous months of 2017 and the second half of 2016, the prices for live Wels catfish and fresh fillets were nearly on the equal level of 5,3 €/kg.

Figure 7: European Catfish - Ex-farm prices in Hungary*



***Source**: European Price Report, Globefish*

European perch *(Perca fluviatilis)*

Introduction

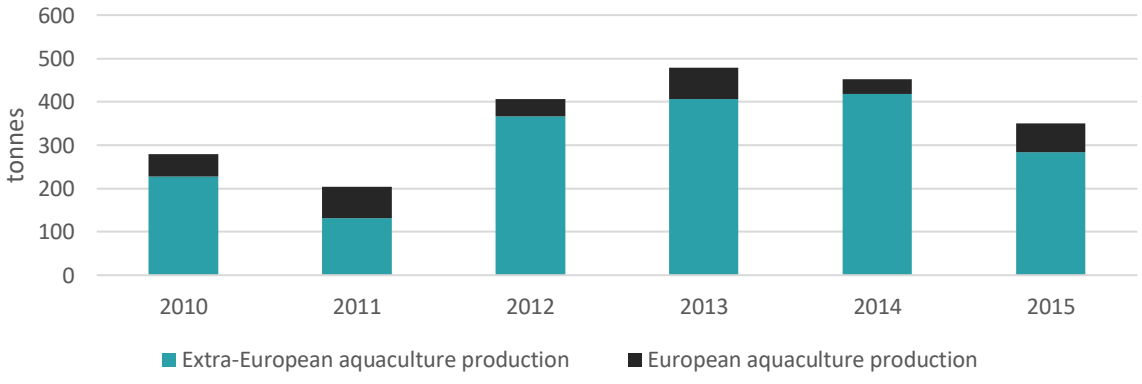
European perch *(Perca fluviatilis)* or Eurasian perch is a medium-size (2-2,5 kg) freshwater fish native to ponds everywhere in Europe, except the Iberian peninsula, central Italy and the Adriatic basin[58]. It is fished for food and is a popular game fish. European perch are active predators, and in many instances where they have been introduced, such as Australia, negative consequences on local fish populations have resulted[59].

Euroepan perch is a relatively new farmed freshwater fish species, and since the supply from the wild is not enough to meet consumer demand, it makes European perch as a promising species for farming. European perch is considered as one of the best tasting freshwater fish species with a delicate taste, which is highly appreciated on several markets in the Alpine area.

Production

Aquaculture of European perch has historically been practiced in Eastern Europe and also France in extensive pond culture. Farming of European perch in recirculating systems has emerged over the past decades to become a significant way of diversification for inland areas in Europe. The extension of such a production relies partly on the improvement of growth performance (i.e., reducing production costs), which requires suitable genetic management of broodstocks and the development of selective breeding programs[60].

Figure 8: Aquaculture production of perch



***Source**: FishstatPLUS, FAO*

[58] http://www.fishbase.org/Summary/Perca-fluviatilis
[59] https://www.dpi.nsw.gov.au/fishing/pests-diseases/freshwater-pests/species/redfin-perch
[60] "Genetic characterization and relatedness of wild and farmed Eurasian perch: possible implications for aquaculture practices", by Sana Ben Khadhera, Pascal Fontainea, Sylvain Millaa, Jean-François Agnèseb, Fabrice Teletchea, 2015

According to Eurostat data, the aquaculture production of European perch in 2015 was estimated at 350 tonnes, where over 80% of the volume was farmed in Extra-EU countries. Switzerland and the Russian Federation were the largest farming countries with 165 tonnes and 119 tonnes of European perch production respectively. Farming of European perch was also registered in Ukraine in the previous years, though the production followed a strong declining trend in the past six years with no records of production volumes in 2015. In 2012-2015, the total farmed production of European perch in Extra-EU countries increased 25% due to the growth of farmed volumes in Switzerland and the Russian Federation.

Table 65. Perch: Global and EU aquaculture production

	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Global:						
Switzerland	50	50	50	165	165	165
Russian Federation	57	35	235	220	233	119
Ukraine	121	47	82	21	20	0
Other	0	0	0	0	0	0
Subtotal	**228**	**132**	**367**	**406**	**418**	**284**
The EU:						
Bulgaria	2	1	0	11	4	38
Czech Republic	18	21	21	20	17	20
United Kingdom					3	3
Other	32	50	19	42	10	5
Subtotal	**52**	**72**	**40**	**73**	**34**	**66**
Total	**280**	**204**	**407**	**479**	**452**	**350**

***Source**: FishstatPlus, FAO*

In 2015, European farmed production of perch was registered at 66 tonnes, when most of the production took place in **Bulgaria** (38 tonnes) and the **Czech Republic** (20 tonnes). Farming of European perch has also been practiced in the **United Kingdom** (some 3 tonnes), and further development of production is considered as promising since the species tolerates a wide range of temperatures and despite being carnivorous, can grow well on diet supplement. In **Estonia**, perch has been farmed in Pärnu, the south-western part of the country, since 2013, using a recirculation system. So far, perch farming can be regarded as successful and supporting the natural stocks[61]. **Latvian** production of perch is carried out in both ponds and recirculating systems with a total production of approximately 700 kg in 2015.

While farming of European perch has been practiced to the limited extend, it is extensively fished in large lakes or reservoirs. The **Russian Federation** is the largest supplier of wild European perch with over 11.000 tonnes in 2015, responsible for 90% of the global catch of the species. **Kazakhstan** (680 tonnes) and **Switzerland** (360 tonnes) are other countries where wild catch of European perch takes place.

[61] "Estonian Fishery 2014-2015", Fisheries Information Center, 2017

Table 66. Perch: Global inland fisheries production						
	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Russian Federation	11.351	14.674	12.880	14.906	14.788	11.045
Kazakhstan	n/a	n/a	668	1103	670	678
Switzerland	371	453	399	377	350	359
Total	**11.964**	**15.255**	**14.097**	**16.524**	**15.998**	**12.274**

***Source**: FishstatPlus, FAO*

Table 67. Perch: EU inland fisheries production						
	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Finland	6.252	6.252	5.281	5.281	6.890	6.890
Sweden	103	97	92	3.219	3.245	3.220
Estonia	1.237	787	1.079	927	803	843
Total	**8.199**	**7.829**	**7.149**	**10.128**	**11.548**	**11.554**

***Source**: FishstatPlus, FAO*

Another 11.560 tonnes of wild European perch were caught from the lakes or reservoirs in European countries in 2015. The largest part of this volume was provided from **Finland** (6.900 tonnes), followed by **Sweden** (3.220 tonnes) and **Estonia** (843 tonnes). The supply of European perch from the wild has generally been on the rise in both European and non-EU countries. In 2012-2015, the total supply from the wild increased from 20.163 tonnes to 23.830 tonnes respectively with the largest increase in Sweden.

Trade

International trade in European perch is not reported in official statistics separately, but grouped with other freshwater species in the EU Combined Nomenclature of the Combined Customs Tariff Schedule. The subheadings for freshwater fish (all species) fall under CN headings 0302, 0303, and 0304.

EU Combined Nomenclature: Provisions for European perch

0302, 0303	Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all freshwater fish*):
0302 89 10	Fresh or chilled fish, excluding fillets and other fish meat, Other
0303 89 10	Frozen fish, excluding fillets and other fish meat, Other
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all freshwater fish*):
0304 49 10	Fresh or chilled fillets and other fish meat, Other
0304 89 10	Frozen fillets and other fish meat, Other

EU trade in the products in these freshwater-fish subheadings increased during 2012-2016. Exports grew by 25 percent to € 153 million, and imports grew by 33 percent to € 285 million. Frozen whole and filleted fish make up the bulk of this trade, with about 85 percent of exports and 75 percent of imports. Intra-EU trade accounts for 80 to 83 percent of exports and about 40 percent of imports.

Market

Based on the information from the industry sources, while European perch is consumed in many countries, the majority of the market revolves around **Switzerland** both geographically and in terms of demand and price. It is estimated that the Swiss market imports around 6.000 tonnes of European perch fillets, German market about 2.000 tonnes, France around 1500 tonnes and Austria around 500 tonnes. Small fillets (15g) with skin on are consumed in the French speaking area, while medium-size fillets (40g) are preferred in German speaking area[62]. The vast majority of European perch consumed in Switzerland is imported from wild fisheries in Russia, Kazakhstan, Estonia and other countries, whereas the contribution from the aquaculture production remains small.

European perch is a **high-value niche** product which occupies an exclusive market segment. It is particularly appreciated and consumed in the Alpine area, including Switzerland, France, Italy, Lichtenstein, Germany and Austria. However, increased consumption of European perch in the area, and especially in Switzerland, is likely to come on provided product development and value added offerings, as consumers' tastes become more refined.

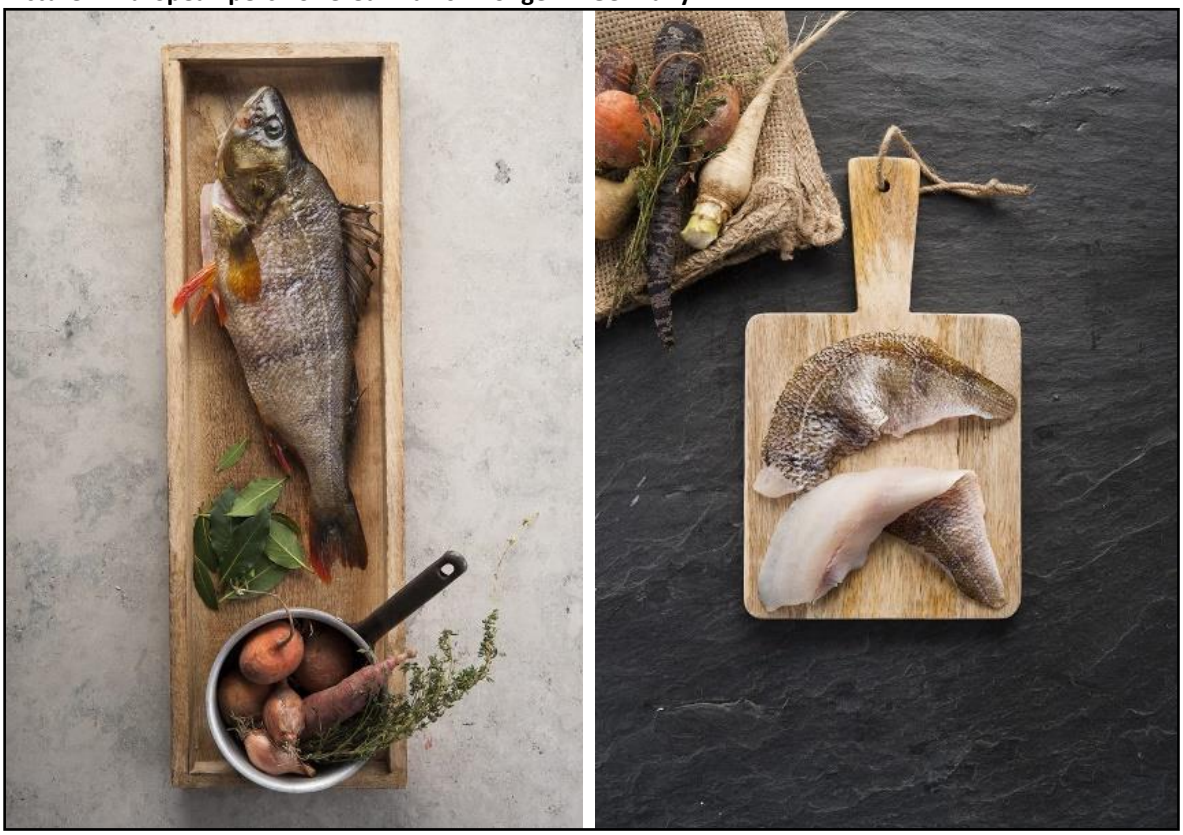
The focus on **sustainability** is particularly important for the Swiss consumers and any production from aquaculture in the future will have to take this into consideration. It is likely in the medium term that large retail multiples will play an increasingly important role in the marketing and sale of European perch products. While aquaculture production will likely grow as global wild catches declined in the past few years, it is uncertain whether the market for perch can be extended beyond its traditional base. If consumption of European perch is to increase, considerable resources will have to be invested in consumer education and perception[63].

European perch represents a good opportunity for farming enterprises due to the undersupply of quality perch fillets in the high-end markets, and a promising candidate for inland aquaculture.

A comparison of perch prices in various retail stores in the main European markets showed that retail prices for perch products in EU supermarkets varied considerably by country and product form.[64] Some of the highest perch prices were found in **Finland, Germany**, and **Italy**. Examples include: frozen pre-packaged perch fillets sold for € 27,50-28,30 in Finland, € 22,00 in Germany, and € 21,30 in Italy. The retail prices of European perch in Germany start with € 17.42 for fresh whole fish and € 25.89 for fresh fillets. In **Lithuania**, fresh whole perch was priced at € 3,20 and smoked perch at € 3,59. Also, frozen perch fillets sold for € 14,00 in **Greece** and € 11,00 in **Portugal**, while fresh perch (loose, not pre-packaged) could be found for € 9,40 in **Poland** and the same product for € 8,96 to € 11,99 (depending on fillet weight) in Portugal. In **Estonia** retail prices for perch preserved in marinade varied by package size and ranged between € 4,88 and € 14,94. Other value-added products include hot-smoked perch rolls for € 4,90-8,58 (depending on product size) in **Lithuania**, and hot-smoked perch for € 3,59 in **Latvia**.

[62] The Irish Sea Fisheries Board
[63] "The market for Eurasian perch", by Daniel Tomien, 2015
[64] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

Picture 4: European perch offered in a fishmonger in Germany



Source: https://www.fischkaufhaus.de/

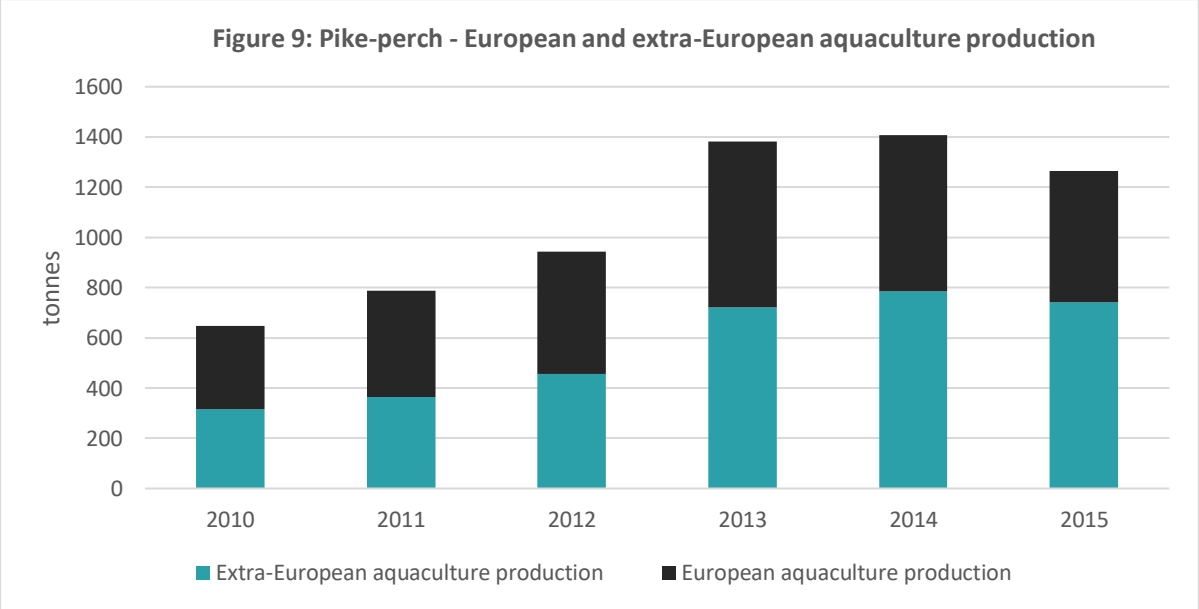
Pike-Perch *(Sander lucioperca)*

Introduction

Often called Zander, pike-perch (*Sander lucioperca*) is a fish from freshwater and brackish habitats in western Eurasia. It is neither a pike nor a perch, both being separate species, but like them pike-perch is a popular game fish and has been introduced to a variety of localities outside its native range. Populations of pike-perch are widely distributed across Eurasia, occurring in the drainages of the Aegean, Aral, Baltic, Black, Caspian, and North Sea basins. Its northern distribution limit is Finland. It has been introduced to the UK and continental Europe, as well as to Anatolia, North Africa, Siberia, Kyrgyzstan, and Kazakhstan.[65]

Production

Aquaculture production of pike-perch has fluctuated in recent years, between a low of 647 tonnes in 2010 and a high of 1.406 tonnes in 2014. The EU accounts for a large share of total production, and EU trends have followed global trands, with production peaking at 784 tonnes in 2014.



***Source**: FishstatPLUS, FAO*

[65] Freyhof, J. & Kottelat, M. (2008). "Sander lucioperca." IUCN Red List of Threatened Species. IUCN (http://www.iucnredlist.org/details/20860/0)

Table 68. Pike-perch: Global and EU aquaculture production						
	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Global:						
Uzbekistan	0	55	140	431	484	425
Tunisia	189	172	212	211	224	235
Tajikistan	15	21	21	22	21	20
Other	111	117	83	58	55	63
Subtotal	**315**	**365**	**456**	**722**	**784**	**743**
EU:						
Netherlands	100	120	120	150	150	150
Romania	57	42	56	43	51	84
Bulgaria	18	16	19	175	145	77
Other	157	244	291	292	276	211
Subtotal	**332**	**422**	**486**	**660**	**622**	**522**
Total	**647**	**787**	**942**	**1,382**	**1,406**	**1,265**

***Source**: Fishstat, FAO*

The Netherlands is the largest EU aquaculture producer, with production that grew from 110 tonnes in 2010 to 150 tonnes in 2015. In second and third place are Romania and Bulgaria, with irregular production trends during the 2010-2015 period. **Lithuania** has a growing production of pike-perch which reached 2,2 tonnes in 2015. Latvian enterprises farm pike-perch in both recirculating systems and ponds with a total production of over 1 tonne in 2014.

The largest share of total supply of pike-perch comes from inland (wild) fisheries. Total inland production peaked at 18.250 tonnes in 2014, before dropping back slightly to 16.989 tonnes in 2015.

Table 69. Pike-perch: Global and EU inland fisheries production						
	2010	2011	2012	2013	2014	2015
	----------Volume in tonnes----------					
Global:						
Kazakhstan	5.525	5.123	3.716	3.761	4.492	5.513
Russian Federation	3.483	3.350	3.697	5.598	5.986	3.970
Ukraine	48	48	47	40	377	476
Other	2.184	1.289	1.186	964	1.012	850
Subtotal	**11.240**	**9.810**	**8.646**	**10.363**	**11.867**	**10.809**
EU:						
Finland	2.853	2.853	2.874	2.874	3.425	3.425
Sweden	517	502	455	840	980	925
Estonia	537	712	681	674	661	465
Other	1.156	1.294	1.246	1.301	1.317	1.365
Subtotal	**5.063**	**5.361**	**5.256**	**5.689**	**6.383**	**6.180**
Total	**16.303**	**15.171**	**13.902**	**16.052**	**18.250**	**16.989**

***Source**: Fishstat, FAO*

More than half of the total inland production comes from EU Member States, whose production also peaked in 2014 at 6.383 tonnes, before declining slightly to 6.180 tonnes in 2015. **Finland** is by far the largest EU producer, followed by **Sweden** and **Estonia**.

Trade

International trade in pike-perch is not reported in official statistics separately, but grouped with other freshwater species in the EU Combined Nomenclature of the Combined Customs Tariff Schedule under CN headings 0302, 0303, and 0304.

EU Combined Nomenclature: Provisions for pike-perch

0302, 0303	Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all freshwater fish*):
0302 89 10	Fresh or chilled fish, excluding fillets and other fish meat, Other
0303 89 10	Frozen fish, excluding fillets and other fish meat, Other
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all freshwater fish*):
0304 49 10	Fresh or chilled fillets and other fish meat, Other
0304 89 10	Frozen fillets and other fish meat, Other

While there are no official statistics on European trade in pike-perch, an increasing number of enterprises in different countries are engaged in pike-perch production and processing with the intent to export.[66] A growing number of pike-perch processors are achieving a key desirable goal for success in exporting: sustainability certification from the Marine Stewardship Council (MSC).[67] An MSC label on an export product is an advantage in selling to European supermarket chains, restaurants, and other buyers whose customers increasingly care about the environmental conditions of their seafood's production methods.

Market

There is substantial evidence of the potential for pike-perch as an inland aquacultured fish. The market for farmed pike-perch is expected to grow as the supply of wild-caught pike-perch continues to decline from its peak of about 50.000 tons in the 1950s to less than 17.000 tons in 2015.[68] Well-known technological problems (e.g. cannibalism in rearing facilities) are being overcome, which helps maintain a reliable supply to the market. Supermarkets, restaurants, and other seafood distributors demand a reliable supply of a particular fish species if they are going to make an effort to promote it to consumers, and producers of farmed pike-perch are increasing effective in maintaining supply.

Producers report that pike-perch flesh quality has a neutral taste, like more popular species such as cod, and milder than "fishy" wild species. It is easy to prepare by a variety of preparation methods (baking, grilling, etc,), and the fillets are without bones, unlike carp and other species with which pike-perch competes in the marketplace.

Pike-perch is sold either as whole fish at a weight of 600-3.000g or as filets of 100-800g to markets in Europe as well as North-America, where it has been showing strong demand. Industry sources report that the market value of pike-perch can be as high as 8-11 €/kg at the ex-farm level for whole fish.

[66] Descriptions of the activities of some of these firms are available at: http://www.balticseafood.pl/eng/balticseafood.html; http://www.kazpravda.kz/en/news/economics/pike-perch-for-export/; http://www.huntfish.ee/fish.php; and http://www.liufish.ee/en/.
[67] https://www.msc.org/newsroom/news/more-swedish-pikeperch-is-msc-certified.
[68] Sources: http://www.diversifyfish.eu/pikeperch-sander-lucioperca.html; *Fishstat Plus* database, FAO.

Table 70. Pike-perch: First-sale prices in selected EU countries							
	2010	2011	2012	2013	2014	2015	2010-2015
	----------Value in €/kg----------						
Finland	5,34	4,90	4,86	5,11	5,11	5,69	6,4%
Poland	5,16	5,25	3,99	3,93	4,08	4,22	-18,3%
Germany	5,85	5,38	4,86	4,72	4,69	5,19	-11,3%
Estonia	4,01	3,76	3,74	3,02	3,40	4,58	14,2%
Latvia	2,13	2,75	1,96	1,86	1,54	1,75	-17,9%
Lithuania	1,04	1,73	1,90	2,28	2,19	0,80	-23,2%
EU average	**5,10**	**4,83**	**4,47**	**4,36**	**4,51**	**5,08**	**-0,2%**

***Source**: EUMOFA*

In the past several years, ex-farm prices for pike-perch in the EU have followed a U-shaped pattern, falling from an EU-wide average of € 5,10 in 2010 to € 4,36 in 2013, before rising to € 5,08 in 2015. This overall trend was naturally influenced by the largest producing countries, including **Finland, Poland,** and **Germany**, while smaller producers such as **Lithuania** experienced somewhat different price trends. Only **Estonia** experienced a net gain in price (up by 14,2 percent) during the period.

A comparison of pike-perch prices in various retail stores in the main European markets showed that retail prices for pike-perch in EU supermarkets varied considerably by country and product form.[69] Some of the highest prices were in **Denmark**, where fresh fillets with skin on were priced at € 53,75-89,58 depending on size. In comparison, the similar product in **Lithuania** was priced at € 14,48. Frozen fillets in **Latvia** were priced at € 19,60. In **Estonia**, fillets in various marinades were priced in the range of €7,48 to € 16,19.

[69] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

Rainbow trout *(Oncorhynchus mykiss)*

Introduction

Rainbow trout (*Oncorhynchus mykiss*) is a freshwater salmonid native to North America. It has long been a popular sport fish for recreational fishermen, but in several decades it has also become popular to farm. Farming of rainbow trout in America dates back to the 1870s, when young trout raised in hatcheries were released to restock rivers and lakes for recreational fishermen. Today, rainbow trout is farmed to adulthood, to provide food directly from the farm, with aquaculture production reportedly occurring in 45 countries.

Production

The production of rainbow trout around the world grew exponentially from the 1950s, especially in Europe and until recently in **Chile**, before peaking around 2013. This growth was primarily due to increased aquaculture production in European countries to supply the domestic markets, and mariculture in cages in Norway and Chile for the export market. Chile was the largest producer, but its trout sector (along with salmon farming) suffered disease outbreaks (including Salmon Rickettsial Septicaemia (SRS), caused by a bacterium infecting trout as well as salmon).[70]

In 2015, the worldwide production of trout amounted to nearly 730 thousand tonnes, of which 80 percent was provided by Extra-EU countries. **Iran** (140 thousand tonnes), **Turkey** (106 thousand tonnes) and Chile (95 thousand tonnes) were the largest producing countries of rainbow trout. In 2012-2015, the global production of trout decreased 18 percent, a decline caused almost entirely by Chile's production cut-back.

In Europe, production of rainbow trout grew from 181,5 thousand tonnes in 2012 to 185,9 thousand tonnes in 2015, increasing 2,4% in this period. **France** (36,5 thousand tonnes), **Denmark** (32,3 thousand tonnes) and **Italy** (31,3 thousand tonnes) are the largest producing countries of trout in the EU, while other major producing countries include **Spain**, **Germany**, **Poland**, the **UK** and others.

The major part of the European rainbow trout farming sector is represented by family-owned and operated businesses, which are located throughout Europe. Many of the farms are equipped to perform primary processing (gutting and gilling), while other farms have full processing facilities, including filleting, smoking, and preparation of various trout products.

Vertical integration in the farmed-trout value chain has become more common in some important markets such as France and northern Europe. Environmental constraints are impeding expansion of rainbow trout farming in Germany. However, German farms are able to sell fresh, high quality products on local market at good prices.

[70] Factsheet for rainbow trout, FAO, http://www.fao.org/fishery/culturedspecies/Oncorhynchus_mykiss/en

Trout (about 16.000 tonnes, mainly rainbow trout) is the second most important farmed species in Poland after carp. Trout is produced mainly in inland concrete raceways in Pomerania in northern Poland, alongside the Baltic Sea. There are only few farms which are using partly recirculating aquaculture systems.

Rainbow trout is the main species in the **Estonian** aquaculture sector with steadily growing production reaching 560 tonnes in 2015. At present, rainbow trout accounted for nearly 70% of the total fish farming production. The proportion of rainbow trout in the Estonian aquaculture sector has definitely been influenced by the farming of new species, such as African catfish and Arctic char, as well as the increase of sales volume of eel farming[71]. Production of rainbow trout in **Lithuania** followed a rapid growth in the past years reaching 280 tonnes in 2015, at present nearly all produced in recirculating systems. **Latvian** enterprises have also significantly increased farming of rainbow trout in both ponds, basins and recirculating systems with a total production of alsmost 70 tonnes in 2015.

Table 71. Rainbow trout: EU and extra-EU aquaculture production

	2012	2013	2014	2015	2012-2015
EU producers:	----------Volume in 1.000 tonnes----------				
France	30,6	30,8	34,0	36,5	19,2%
Denmark	31,5	33,8	35,8	32,3	2,8%
Italy	35,3	35,1	31,3	31,3	-11,2%
Other	84,2	83,6	86,1	85,8	1,9%
Subtotal EU	**181,5**	**183,4**	**187,2**	**185,9**	**2,4%**
Extra-EU:					
Iran	131,0	143,9	126,5	140,6	7,4%
Turkey	114,6	128,1	112,3	106,6	-7,0%
Chile	254,4	142,7	151,8	94,7	-62,8%
Other	202,0	218,7	228,0	233,9	15,8%
Subtotal extra-EU	**701,9**	**633,4**	**618,6**	**575,9**	**-18,0%**
Total	**883,5**	**816,7**	**805,8**	**761,8**	**-13,8%**

***Source**: Fishstat, FAO*

Rainbow trout can be farmed in both fresh and saltwater. European production of farmed rainbow trout is represented mainly by portion-size fish (72%), which is farmed in freshwater (inland) bodies, and larger fish (28%) which is farmed in marine waters. These two categories of trout are produced using different technologies. A significant part of the portion-size trout is produced in large recirculation aquaculture facilities capable of farming large volumes of trout at relatively lower costs, while larger trout in marine areas are farmed using more traditional technology.

Inland (freshwater) production of rainbow trout, which focuses mainly on smaller, portion-sized fish, dropped by half during 2012-2015, to 1.075 tonnes in the latter year. Smaller producers in the EU were almost entirely accountable for this, as their combined production fell by 96,2 percent during the period.

[71] "Estonian Fishery 2014-2015", Fisheries Information Center, 2017

Table 72. Rainbow trout: EU and extra-EU inland fisheries production					
	2012	2013	2014	2015	2012-2015
EU producers:	----------Volume in tonnes----------				
Finland	311	311	359	359	15,4%
Czech Republic	58	58	61	61	5,2%
Slovakia	46	47	51	57	23,9%
Other	1.080	1.394	40	41	-96,2%
Subtotal EU	**1.495**	**1.810**	**511**	**518**	**-65,4%**
Extra-EU:					
Peru	394	439	329	291	-26,1%
USA	143	154	188	212	48,3%
Russia	27	11	374	43	59,3%
Other	135	318	325	11	-91,9%
Subtotal extra-EU	**699**	**922**	**1.216**	**557**	**-20,3%**
Total	**2.194**	**2.732**	**1.727**	**1.075**	**-51,0%**
EU share of Total	68,1%	66,3%	29,6%	48,2%	

***Source**: Fishstat, FAO*

While trout production has recently declined in Europe, it has grown rapidly in **Turkey**, reportedly due to increased technical capacity, public support, and parallel improvements in logistics and processing sectors. In a five-year period from 2008 to 2013, Turkish rainbow trout production doubled from 66.000 tonnes to 111.335 tonnes. The significance of the rising supply of Turkish trout products in European markets was underlined by many European trout producers claiming that the competition from Turkey puts European trout farmers in an even more difficult situation.[72] As a consequence, a complaint was filed by these producers with the European Commission alleging subsidization by the Turkish Government. The EC, upon investigation, found such subsidization had occurred and on 27 February 2015, imposed countervailing duties (duties to offset subsidization) of 6,7-9,5 percent of import value of Turkish rainbow trout (the range of duties applied to different Turkish exporters, who received differing levels of subsidies).

Trade

In international trade statistics, rainbow trout is classified with other salmonid species in the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members), rainbow trout is provided for in CN headings 0302, 0303, 0304, and 0305.

EU trade in rainbow trout has been increasing in recent years, alongside the rising production from Scandinavia. By far the commercially most important rainbow trout product traded among EU Member States is fresh product, followed by smoked and frozen forms.

[72] "EU hits Turkey with 5-year duties on trout to counter subsidies", 27 February 2015, available at http://antidumping.vn/eu-hits-turkey-with-5year-duties-on-trout-to-counter-subsidies-n13277.html.

EU Combined Nomenclature: Provisions for Rainbow trout

0302, 0303 Fish, excluding fillets and other fish meat, fresh, chilled or frozen:
Of the species *Oncorhynchus mykiss*, with heads and gills on, gutted, weighing more than 1,2 kg each, or with heads off, gilled and gutted, weighing more than 1 kg each:
0302 11 20 Fresh or chilled
0303 14 20 Frozen
Other (Note: includes all trout except rainbow trout of the above subheadings, and all trout of the species *Oncorhynchus clarki, Oncorhynchus aguabonita,* and *Oncorhynchus gilae*)
0302 11 80 Fresh or chilled
0303 14 90 Frozen

0304 Fillets and other fish meat (whether or not minced):
Of the species *Oncorhynchus mykiss*, with heads and gills on, gutted, weighing more than 1,2 kg each, or with heads off, gilled and gutted, weighing more than 1 kg each:
0304 42 10 Fresh or chilled
0304 82 10 Frozen
Other fillets and other fish meat (whether or not minced) except rainbow trout of the above subheadings, and all trout of the species *Oncorhynchus clarki, Oncorhynchus aguabonita,* and *Oncorhynchus gilae*):
0304 42 50 Fresh or chilled
0304 82 50 Frozen

0305 Smoked fish, including fillets
0305 43 00 Trout (*Note: includes all trout species*)

European trade of **trout** products, including portion-size trout and large rainbow trout, is very much an intra-EU business. In 2015, more than 90 percent of EU Member State exports were shipped to other EU Member States, up from about 85 percent in 2012. EU exports of trout (mainly rainbow) have grown irregularly in recent years. By value, exports totalled € 313,5 million in 2015, an increase of 28,8 percent over 2012, By volume, such exports reached 62,6 thousand tonnes, up by 15,5 percent over 2012.

Table 73. Trout: EU exports to intra-EU and extra-EU markets

	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Intra-EU	207.871	229.472	270.180	284.280	36,8%
Extra-EU	35.520	35.932	30.799	29.239	-17,7%
Total	**243.391**	**265.404**	**300.979**	**313.519**	**28,8%**
Intra-EU share	85,4%	86,5%	89,8%	90,7%	
	----------Volume in tonnes----------				
Intra-EU	45.645	45.444	52.423	57.546	26,1%
Extra-EU	8.595	7.301	5.502	5.097	-40,7%
Total	**54.241**	**52.745**	**57.925**	**62.643**	**15,5%**
Intra-EU share	**84,2%**	**86,2%**	**90,5%**	**91,9%**	

***Source**: Eurostat*

A significant part of EU Member State imports is supplied by four other EU Member States: **Sweden, Denmark, Finland and France.** Together these exporters supplied 46,9 percent of the total EU trout import volume in 2015, while the rest (53,1 percent) was supplied by extra-EU trade partners.

Table 74. Trout: Major EU suppliers of EU Member State imports (value)

	2012	2013	2014	2015	2012-2015
Source	----------**Value in € 1.000**----------				
Sweden	34.800	46.988	60.222	58.570	68,3%
Denmark	34.827	38.217	48.426	51.613	48,2%
Finland	4.827	11.454	13.507	11.691	142,2%
France	6.625	10.252	10.510	9.098	37,3%
Subtotal	**81.079**	**106.911**	**132.665**	**130.972**	**61,5%**
Total EU imports	**228.736**	**276.192**	**322.371**	**341.394**	**49,3%**
Subtotal share	**35,5%**	**38,7%**	**41,2%**	**38,4%**	

***Source**: Eurostat*

Table 75. Trout: Major EU suppliers of EU Member State imports (volume)

	2012	2013	2014	2015	2012-2015
Source	----------**Volume in tonnes**----------				
Sweden	11.507	12.061	14.258	15.653	36,0%
Denmark	7.581	9.187	10.315	9.469	24,9%
Finland	1.401	2.773	2.851	2.782	98,6%
France	2.106	2.916	3.458	2.894	37,4%
Subtotal	**22.595**	**26.937**	**30.882**	**30.798**	**36,3%**
Total EU imports	**48.505**	**54.604**	**59.732**	**65.697**	**35,4%**
Subtotal share	**46,6%**	**49,3%**	**51,7%**	**46,9%**	

***Source**: Eurostat*

Imports of trout by the Baltic States (**Estonia, Latvia,** and **Lithuania**) grew by 15,5 percent in both volume and value during 2012-2015, reaching 1.800 tonnes, valued at € 12,1 million, in 2015. As a market for exports from EU Member States, these three countries' imports grew from 2,4 percent to 2,9 percent of all EU exports measured by volume, and from 2,5 percent to 3,9 percent of all EU exports by value during 2012-2015.

Table 76. Trout: Baltic State imports, volume and value					
	2012	2013	2014	2015	Change, 2012-2015
	----------Volume in tonnes----------				
Estonia	691,6	510,8	809,2	1.148,2	66,0%
Latvia	415,1	560,4	261,8	311,3	-25,0%
Lithuania	202,2	323,2	250,8	340,5	68,4%
Subtotal	1.308,9	1.394,4	1.321,8	1.800,0	37,5%
EU exports	**54.240,8**	**52.744,8**	**57.925,1**	**62.643,2**	**15,5%**
The share of the Baltic countries:					
	2,4%	**2,6%**	**2,3%**	**2,9%**	
	----------Value in € 1.000----------				
Estonia	4.394,6	4.247,5	7.416,3	9.708,7	120,9%
Latvia	1.229,0	2.035,4	1.004,7	1.026,6	-16,5%
Lithuania	527,8	1.419,8	952,3	1.408,0	166,8%
Subtotal	6.151,3	7.702,7	9.373,3	12.143,4	97,4%
EU exports	**243.390,5**	**265.404,4**	**300.978,8**	**313.519,3**	**15,5%**
The share of the Baltic countries:					
	2,5%	**2,9%**	**3,1%**	**3,9%**	

***Source**: Eurostat*

Market

A large share of each EU Member State's trout market is supplied with imports. Total EU trout imports (intra- and extra-EU) in 2015 reached 65,7 thousand tonnes, valued at € 341,4 million. This represented an increase of 35 percent in volume and 49 percent in value over 2012 imports of 48,5 thousand tonnes, valued at € 228,7 million. Only a small proportion of imports by EU Member States comes from outside the EU, and this proportion declined during 2012-2015.

Table 77. Trout: EU imports from intra-EU and extra-EU sources					
	2012	2013	2014	2015	Change, 2012-2015
	----------Value in € 1.000----------				
Intra-EU	190.707,6	237.203,1	285.266,8	305.036,5	59,9%
Extra-EU	38.028,9	38.988,6	37.103,9	36.357,9	-4,4%
Total	**228.736,5**	**276.191,6**	**322.370,7**	**341.394,4**	**49,3%**
Intra-EU share	83,4%	85,9%	88,5%	89,4%	
	----------Volume in tonnes----------				
Intra-EU	42.571,0	49.138,3	54.946,5	60.821,1	42,9%
Extra-EU	5.934,2	5.466,1	4.785,2	4.875,6	-17,8%
Total	**48.505,2**	**54.604,4**	**59.731,7**	**65.696,7**	**35,4%**
Intra-EU share	87,8%	90,0%	92,0%	92,6%	

***Source**: Eurostat*

Germany is by far the largest trout importer in the EU, with a share exceeding 30 percent. Germany's imports of intra-EU trout totalled 17,8 thousand tonnes in 2015, up only slightly from previous years. Germany's market is mainly for frozen trout, mostly from **Turkey** and **Denmark**, with smaller import shares for fresh trout (mainly from Denmark) and smoked and salted trout, mostly with supplies from Poland.

Poland has recently become the second largest trout importer in the EU, in addition to the country's own large production. In 2015, Poland imported just over 9.000 tonnes of trout, an increase of 122 percent over 2012 imports of about 4.000 tonnes.

Following these import markets in size are **Finland** (7.099 tonnes) and **Estonia** (4.042 tonnes). Estonia's imports have also grown rapidly: 2015 imports were 65 percent greater than just three years earlier.

Table 78. Trout: Major markets for EU Member State exports (value)

	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Germany	103.673	111.952	122.198	123.504	19,1%
Finland	20.484	22.156	31.022	29.177	42,4%
Poland	12.814	16.961	27.162	34.629	170,2%
Estonia	7.823	10.985	15.528	15.607	99,5%
Austria	10.441	11.993	12.549	12.332	18,1%
Subtotal	155.235	174.046	208.459	215.249	38,7%
Total EU exports	**243.391**	**265.404**	**300.979**	**313.519**	**28,8%**
Subtotal share	63,8%	65,6%	69,3%	68,7%	

***Source**: Eurostat*

Table 79. Trout: Major markets for EU Member State exports (volume)

	2012	2013	2014	2015	2012-2015
	----------Volume in tonnes----------				
Germany	17.288	17.434	17.868	17.815	3,1%
Finland	6.064	5.809	7.033	7.099	17,1%
Poland	4.070	4.365	6.413	9.029	121,8%
Estonia	2.451	2.722	3.497	4.042	64,9%
Austria	2.658	2.824	2.883	2.787	4,9%
Subtotal	32.530	33.154	37.694	40.772	25,3%
Total EU exports	**54.241**	**52.745**	**57.925**	**62.643**	**15,5%**
Subtotal share	60,0%	62,9%	65,1%	65,1%	

***Source**: Eurostat*

The main market issues for European producers of trout can be summarized as follows: stable sale prices along with increasing production costs (including costs of feed, energy, amortization, etc,), moderate demand on most of the markets, and competition with other farmed fish species (especially salmon), and competition with trout from Turkey.

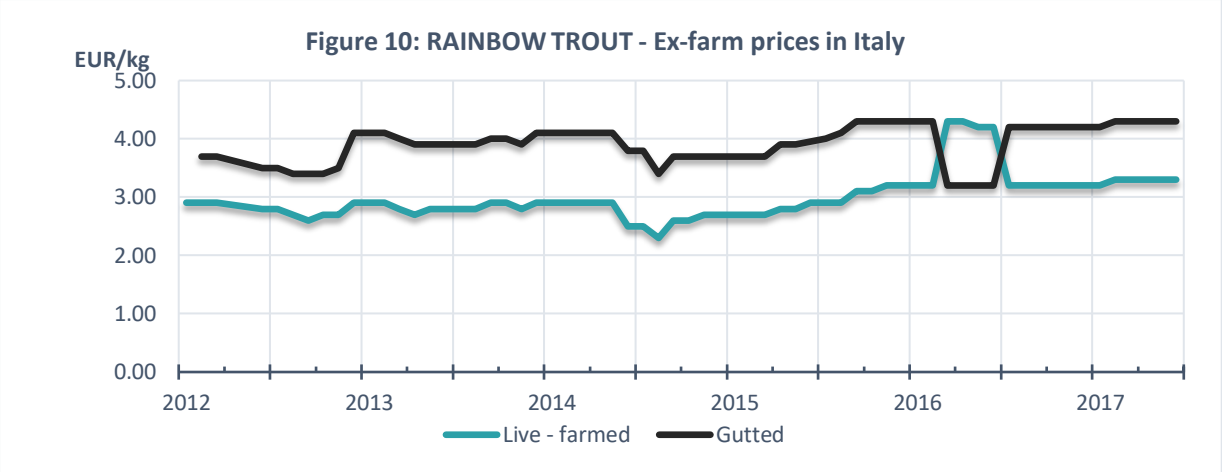
Table 80. Trout: Baltic State exports, volume and value					
	2012	2013	2014	2015	2012-2015
	----------Volume in tonnes----------				
Estonia	2.450,7	2.722,4	3.496,7	4.042,3	64,9%
Latvia	696,3	793,9	623,5	900,1	29,3%
Lithuania	1.071,4	692,4	245,7	301,1	-71,9%
Subtotal	**4.218,4**	**4.208,7**	**4.365,9**	**5.243,5**	**24,3%**
EU imports	48.505,2	54.604,4	59.731,7	65.696,7	15,5%
Baltic export share of EU imports:					
	8,7%	**7,7%**	**7,3%**	**8,0%**	
	----------Value in € 1.000----------				
Estonia	7.822,5	10.984,6	15.528,5	15.607,5	99,5%
Latvia	1.985,3	2.973,9	2.472,0	3.439,2	73,2%
Lithuania	2.883,2	2.659,4	878,5	972,9	-66,3%
Subtotal	**12.691,0**	**16.617,9**	**18.879,0**	**20.019,6**	**57,7%**
EU imports	228.736,5	276.191,6	322.370,7	341.394,4	15,5%
Baltic export share of EU imports:					
	5,5%	**6,0%**	**5,9%**	**5,9%**	

***Source**: Eurostat*

As contributors to the EU import market as a whole, trout exports from **Estonia, Latvia,** and **Lithuania** declined slightly by volume from 8,7 percent to 8,0 percent of all EU imports measured by volume, but grew in importance by value, from 5,5 percent to 5,9 percent of all EU imports during 2012-2015.

Table 81. Rainbow trout: Selected on-line retail prices in the UK				
Product	Size	Price	Price/kg	Price/kg (euros)
2xM Rainbow trout	540g	£9,70	£17,96	€20,11
2xM Rainbow trout	560g	£10,10	£18,04	€20,19
2xM Rainbow trout	580g	£10,50	£18,10	€20,27
2xM Rainbow trout	600g	£10,90	£18,17	€20,34
2xL Rainbow trout	620g	£11,40	£18,39	€20,59
2xL Rainbow trout	640g	£11,80	£18,44	€20,64
2xL Rainbow trout	680g	£12,60	£18,53	€20,74
SAVER PACKS:				
Rainbow trout 6M	1.680g	£27,90	£16,61	€18,59
Rainbow trout 6M	1.740g	£28,90	£16,61	€18,59
Rainbow trout 6M	1.800g	£29,90	£16,61	€18,59
Rainbow trout 6M	1.860g	£30,90	£16,61	€18,59
Rainbow trout 6L	2.040g	£35,50	£17,40	€19,48

***Source**: https://www,thefishsociety,co,uk/eating-experience/rainbow-trout/rainbow-trout,html, 3Q2017 price information*



***Source**: European Price Report, Globefish*

Picture 5: Smoked trout products in a UK fishmonger store

***Source**: The Fish Society UK*

A comparison of trout prices in various retail stores in the main European markets showed that retail prices for trout products (including whole rainbow) in EU supermarkets varied considerably by country and product form.[73] For whole trout, the highest prices were found in **Denmark**. However, the Danish trout market is unique because it is heavily skewed by "organic" trout products, which command sharply higher prices than those for similar yet non-organic trout products in Denmark or elsewhere.[74] These higher prices result not only from the higher production costs but also the willingness of a portion of the consumer population to pay more for organic products. Aside from Denmark, the highest prices for whole trout were observed in **Italy** (€ 13,00), the **Netherlands** (a range of € 12,90-12,98), and **Latvia** (a range of € 8,75-12,64). Prices were also relatively high in **Hungary** (€ 6,57-8,87). Ranges in prices were usually due to differing sizes of whole fish or, in some cases, different prices in different stores.

Prices for fresh trout fillets -- again excluding Denmark -- were highest in **Austria** (€ 35,43-36,91) and **Finland** (€ 32,67). Mid-level prices were observed in **Ireland** (€ 15,59-16,67) and **Italy** (€ 14,99-25,00). Again, ranges within a country resulted from either differing package sizes or retailers. No prices were available in the survey from **Estonia, Latvia**, or **Lithuania**.

[73] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

[74] Of the 49 separate price observations for trout in Danish retail stores, 40 were for organic trout products.

For frozen trout fillets, prices were highest in the **Netherlands** (€ 27,96) and **Austria** (€ 19,98). Salted trout fillets were found for sale in **Estonia** (€ 20,33-36,90) and **Finland** (€ 14,92-30,89). Smoked trout fillets were observed in several countries, the highest prices being found in **Austria** (€ 29,90-69,90), **Denmark** (€ 22,35-51,06), **Finland** (€ 21,25-40,36), **Croatia** (€ 40,36), and **Estonia** (€ 16,39-31,25). In **Estonia**, prices were also observed for trout in marinade (€ 21,17) and trout seasoned with herbs or pepper (€ 29,50 for each seasoned product).

Red claw *(Cherax quadricarinatus)*

Introduction

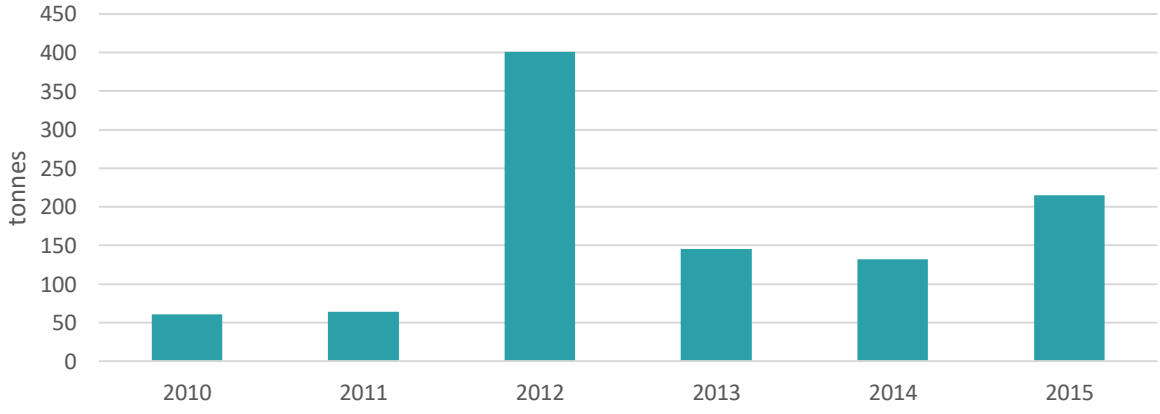
Red claw crayfish (*Cherax quadricarinatus*) are relatively large freshwater crayfish (up to 500 g), with a smooth, lustrous deep blue to green shell. The species market name derives from the bright red colouring on the margins of the large claws of the males. Red claw crayfish are distinguished from other crayfish by size, colour and the presence of four distinct anterior ridges (carinae) of the carapace.

Red claw crayfish is a tropical species native to the rivers of north-west Queensland and the Northern Territory in Australia. It has been exported to other countries such as in Latin America, where commercial aquaculture production has now been established. There is thus far no known EU commercial production of red claw crayfish.

Production

Global production of red claw crayfish grew irregularly during 2010-2015. Production averaged 210 tonnes during 2010-2015, although without a one time spike in **Mexican** output in 2012 the average would have been closer to 160 tonnes. **Malaysia** and **Australia** were the largest producers during this period.

Figure 11: Global aquaculture production of red claw



Source: *FishstatPLUS, FAO*

Table 82. Red claw: Global aquaculture and inland fisheries production						
	2010	2011	2012	2013	2014	2015
Aquaculture:	----------(tonnes)----------					
Malaysia	n/a	n/a	n/a	96	76	149
Australia	57	52	41	41	36	45
Mexico	1	9	357	5	17	18
Other	3	3	3	3	3	3
Subtotal	61	64	401	145	132	215
Inland fisheries:	----------(tonnes)----------					
Ecuador	74	86	45	18	15	8
Other	0	0	0	0	0	0
Subtotal	**74**	**86**	**45**	**18**	**15**	**8**
Total	**135**	**150**	**446**	**163**	**147**	**223**

***Source**: Fishstat, FAO*

Farmed red claw crayfish are produced using berried females or mature broodstock from the harvests of grow-out ponds, which are then restocked into juvenile rearing ponds. The best times for breeding and production takes place in the summer, when temperatures exceed 25 degrees Celcius. [75] Typically a period of three to four months is necessary to achieve a mean size of juveniles of between 5 and 15 g.

Juvenile production ponds provide an abundance of planktonic organisms which the juvenile crayfish consume as food. Thus, little or no added feed is required. As they grow, the juveniles progressively consume less plankton and more of the detrital food that occurs on the surface of the shelter material and the mud.

Harvesting of the juveniles is achieved by a number of methods. The most effective method is with a flow trap, in which the pond is completely drained and all the crayfish are attracted into a trap. From there the crayfish are removed and sorted, and then stocked in the grow-out ponds. Grow-out ponds are prepared with applications of lime, inorganic fertilisers and some organic material such as hay or manure, causing a bloom of plankton that provides food and reduces the penetration of light.

The maximum grow-out period without grading should be six to nine months. At each harvest, the stock is size-graded and redistributed as breeding stock, or for marketing or for further grow-out. An average yield of more than 5 tonnes per hectare can reportedly be achieved.

The majority of red claw are sold live, and so after harvesting, the stock is held in tanks with flowing water or an RAS involving biological filtration. Storage in the tank for a day enables a purging of the crayfish gut prior to packing for transport. If they are kept cool and moist red claw can survive several days or a week out of water. Thus they should be packed in insulated containers with moist packing material and chilled packs.

[75] For more information on red claw aquaculture production methods, see "How to farm red claw crayfish," https://thefishsite.com/articles/cultured-aquatic-species-red-claw-crayfish.

Trade

Recorded data on EU trade in red claw crayfish are not available, but there are extensive data on trade in the broader category of crayfish of all species. Red claw crayfish are grouped with other crayfish species in trade data reported under the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members). Crayfish trade data are reported under CN heading 0306.

EU Combined Nomenclature: Provisions for crayfish

0306	Crustaceans, whether in shell or not, live, fresh, chilled, frozen, dried, salted or in brine; smoked crustaceans, whether in shell or not, whether or not cooked before or during the smoking process:
0306 19 10	Freshwater crayfish, frozen
0306 39 10	Freshwater crayfish, live, fresh or chilled

A detailed description of EU trade in crawfish, including levels and trends in Baltic country trade, is presented in the earlier discussion of European crayfish. In summary, EU crayfish exports decreased by over 44 percent in both value and volume during 2012-2015, while average unit values of exports stayed unchanged in 2015 compared to 2012.

EU crayfish imports followed a different trend, with declining volumes offset by sharply higher unit values, to result in large increases in import value. Total imports rose by 19,8 percent in value, to € 77,7 million in 2015, while volume declined by 4,3 percent to 8,388 tonnes. As a result, the average unit value (euro/kg) of imports grew by 25,1 percent, to 9,27 €/kg in 2015.

Market

Although no market for red claw crayfish currently exists in Europe, some insights may be gained from the experiences in marketing red claw in Australia, its native land. There, the industry features many small farms, which collectively do not produce enough to reliably service any significant market. The industry has not attracted large scale operations and total production is small, thus severely limiting market development.

In major markets for red claw, they are typically sold in 20-gram size categories ranging from 30-50 g, 50-70 g, up to >120 g. The smaller size categories are often used in buffet settings, with the larger animals offered as entree and main-course dishes.

There are three steps in the market chain for red claw crayfish; producer, wholesaler and restaurants. There are little or no retail sales of the raw product. Although direct marketing to restaurants can obtain higher prices, this method can also limit market growth. Direct-from-the-farm sales are common, but the quantities tend to decline as marketing through wholesalers develops. Red claw is usually priced lower than lobsters but higher than shrimp. Generally they are marketed alongside other crayfish, lobsters, or spiny (e.g., Caribbean) lobsters.

A marketing advantage for red claw crayfish is its reputation as a product from clean water, free of additives. The product is purged prior to sale and is often held in saltwater, which improves the flavour and its attractiveness in ethnic markets. Red claw crayfish are mainly sold as a live product, although some processing, particularly cooking and freezing can be carried out as well.

Sturgeons *(Acipenser baerii; Acipenser gueldenstaedtii; Acipenser ruthenus)*

Acipenser baerii

Acipenser gueldenstaedtii

Acipenser ruthenus

Introduction

Sturgeons (*Acipenser baerii; Acipenser gueldenstaedtii; Acipenser ruthenus*) look like the ancient, prehistoric animals they are, with fossils dating back to the Triassic Period over 200 million years ago. More recently, they have become a widely farmed fish for their meat and roe. Today sturgeon is farmed in Europe, the Americas, and Asia. Sturgeons are long-lived and late-maturing: it can be more than 10 years before a sturgeon first spawns, and so the required investment in their farming can be large.

Production

Global aquaculture production of sturgeon reached a record 102,5 thousand tonnes in 2015, an increase of 20 percent over the preceding year and 160 percent from 2010. All the largest producers are outside the EU and include **Russia, Iran, Belarus, Argentina, Uruguay, Saudi Arabia, Israel, Armenia,** and **Azerbaijan**. Within the EU, the largest producers include **Italy, Germany, Bulgaria, Spain, Cyprus, France**, and **Poland.**

Table 83. Sturgeon: Global aquaculture production (tonnes)

	2010	2011	2012	2013	2014	2015
Selected species:						
Acipenser baerii						
Uruguay	70	62	-	195	190	150
Belarus	52	74	67	43	83	89
Argentina		2	6	48	40	52
Acipenser gueldenstaedtii						
Uruguay	-	-	-	-	-	48
Israel	30	30	30	30	30	30
Saudi Arabia	30	30	30	39	35	26
Acipenser ruthenus						
Belarus	13	33	31	28	16	8
Other	39.073	49.784	62.417	73.251	85.095	102.068
Total	**39.268**	**50.015**	**62.581**	**73.634**	**85.489**	**102.471**

***Source**: Fishstat, FAO*

Table 84. Sturgeon: EU aquaculture production (tonnes)						
	2010	2011	2012	2013	2014	2015
Selected species						
Acipenser baerii						
Bulgaria	-	19	14	8	20	109
Spain	70	55	77	74	22	10
Cyprus	2	1	6	0	1	3
Acipenser gueldenstaedtii						
Bulgaria	333	215	278	261	234	221
Acipenser ruthenus						
Bulgaria	0	-	1	1	3	4
Other	1.388	1.531	1.716	1.973	2.141	2.279
Total	**1.793**	**1.821**	**2.092**	**2.317**	**2.421**	**2.626**

***Source**: Fishstat, FAO*

According to the FEAP, European production of farmed sturgeon (all species) grew from 2.497 tonnes in 2012 to 2.838 tonnes in 2014, before falling back somewhat to 2.559 tonnes in 2015. The largest producers, reported by FEAP, are **Italy, Germany, France, Poland** and **Spain.**

Since 2010, sturgeon farming in **Lithuania** has followed a significant increase reaching 90,6 tonnes of sturgeon production, including sturgeon nei in 2015. In Latvia, development of sturgeon farming in recirculating systems has been remarkable with an increase from 5 tonnes in 2011 to over 65 tonnes in 2015. In addition, **Latvian** enterprises farm sturgeon in ponds and water basins with a total of 20 tonnes in 2015. Siberian sturgeon and Russian sturgeon are also farmed in **Estonia**, where production of various sturgeon species of the Acipenser family had gained peak in a number of Estonian regions in 2013, but production and sales volumes have been affected by farmers' focus on the estern markets and strict marketing restrictions[76].

Table 85. Sturgeons: European production (tonnes)					
	2012	2013	2014	2015	2012-2015
Producer					
Italy	1.700	1.900	2.000	1.480	-12,9%
Germany	240	150	300	225	-6,3%
France	250	280	298	241	-3,6%
Poland	241	95	140	193	-19,9%
Spain	66	66	100	120	81,8%
Other	-	-	-	300	n/a
Total	**2.497**	**2.491**	**2.838**	**2.559**	**2,5%**

***Source**: Federation of European Aquaculture Producers*

In addition, there are small amounts of sturgeon produced from inland (freshwater) fisheries. This sector has been shrinking in recent years, with output declining from 389 tonnes in 2010 to 213 tonnes in 2015.

[76] "Estonian fishery 2014-2015", Fisheries Information Center, 2017

Trade

Data on international trade in sturgeon and sturgeon roe (caviar) are reported in official statistics for the EU Combined Nomenclature of the Combined Customs Tariff Schedule, under CN headings 0302, 0303, 0304, and 1604.

By far the most important sturgeon product traded internationally by EU Member States is salted sturgeon roe, or caviar.[77] Sturgeon roe exports by EU Member States totalled 613,4 tonnes, valued at € 42,1 million, in 2015, an increase of 50 percent in volume and 9 percent in value from export levels in 2012. There was a significant bump in exports in 2014. Average unit values of EU sturgeon roe exports fell by 27,1 percent during 2012-2015, with intra-EU export unit values falling farther than the average.

EU Combined Nomenclature: Provisions for sturgeon and caviar

0302, 0303	Fish, excluding fillets and other fish meat, fresh, chilled or frozen (*Note: includes all freshwater fish*):
0302 89 10	Fresh or chilled fish, excluding fillets and other fish meat, Other
0303 89 10	Frozen fish, excluding fillets and other fish meat, Other
0304	Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (*Note: includes all freshwater fish*):
0304 49 10	Fresh or chilled fillets and other fish meat, Other
0304 89 10	Frozen fillets and other fish meat, Other
1604 31 00	Caviar

There is a large difference between the high prices for extra-EU caviar and the much lower prices for intra-EU caviar. This is largely due to the different species of sturgeon from which roe is taken. The highest priced caviar comes from beluga and sterlet sturgeon native to the Caspian and Black seas. Fishing was temporarily halted and trade in these species' roe was banned by CITES, but after 2011 these restrictions have been relaxed. Nevertheless, the ban was sufficient to encourage aquaculture of these species, but the quality of such roe reportedly is inconsistent compared with roe from wild sturgeon.[78]

Table 86. Sturgeon roe: EU Member State exports, by destination

	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				(%)
Intra-EU	21.669,7	22.368,2	23.196,9	22.613,4	4,4%
Extra-EU	16.866,6	18.556,3	19.715,4	19.490,7	15,6%
Total	**38.536,3**	**40.924,5**	**42.912,3**	**42.104,0**	**9,3%**
	----------Volume in tonnes----------				
Intra-EU	372	276,6	692,4	572,5	53,9%
Extra-EU	37,2	38,9	43,2	40,9	9,9%
Total	**409,2**	**315,5**	**735,6**	**613,4**	**49,9%**
	----------€/kg----------				
Unit value					
Intra-EU	58,25	80,87	33,50	39,50	-32,2
Extra-EU	453,40	477,03	456,37	476,54	5,1
Average	94,17	129,71	58,34	68,64	-27,1

Source: *Eurostat*

[77] Sturgeon, whether in whole or filleted form, either fresh or frozen, are not reported separately in EU trade statistics

[78] "The cost of caviar," https://www.gourmetfoodstore.com/cost-of-caviar-15830. "Russian caviar goes back on the European menu after nine years," http://www.independent.co.uk/news/world/europe/russian-caviar-goes-back-on-the-european-menu-after-nine-years-2205035.html. "The Complete Guide To Buying and Eating Caviar," http://stylecaster.com/complete-guide-on-how-to-buy-and-eat-caviar/

The largest destinations for the EU's exporters of sturgeon roe include **Germany, France,** the **United Kingdom,** the **United States, Japan,** and **Switzerland.** Together these countries took 50 percent of the volume of EU exports of sturgeon roe in 2015. EU Member State exports to these large importers grew by 190 percent in volume during 2012-2015, but fell in value by 37 percent during the same period, indicating a sharp reduction in prices in those countries. EU exports to other importing countries have fared much better in terms of prices, with the total value of such exports rising by 60,5 percent during 2012-2015, while the volume of such exports was left almost unchanged.

Table 87. Sturgeon roe: Major markets for EU exports (value)

	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				(%)
Germany	5.886	3.173	2.658	3.510	-40,4%
France	4.351	3.002	2.668	3.083	-29,1%
United Kingdom	2772	1.975	2.308	2.392	-13,7%
United States	2.908	1.833	2.698	1.739	-40,2%
Japan	2.399	1.607	1.495	1.350	-43,7%
Switzerland	1.947	495	875	711	-63,5%
Subtotal	20.264	12.085	12.701	12.785	-36,9%
Other	18.273	28.840	30.211	29.319	60,5%
Total	**38.536**	**40.925**	**42.912**	**42.104**	**9,3%**
Subtotal %	52,6%	29,5%	29,6%	30,4%	

***Source**: Eurostat*

Table 88. Sturgeon roe: Major markets for EU exports (volume)

	2012	2013	2014	2015	2012-2015
	----------Volume in tonnes----------				(%)
Germany	69,6	49,2	54,3	10,9	-84,3%
France	15,2	14,2	322,7	261,9	1623,0%
United Kingdom	7,8	6,8	7,8	7,5	-3,8%
United States	7,1	7,5	5,4	8,2	15,5%
Japan	3,5	5,2	4,6	6,6	88,6%
Switzerland	2,8	10,6	11,5	12	328,6%
Subtotal	106	94	406	307	189,7%
Other	303	222	329	306	1,0%
Total	**409**	**316**	**736**	**613**	**49,9%**
Subtotal %	25,9%	29,6%	55,2%	50,1%	

***Source**: Eurostat*

Baltic countries' purchases of EU Member State exports grew in importance, both in absolute size and in relation to the size of the EU industry, during 2012-2015. EU Member State exports to Lithuania, Latvia and Estonia grew from 19,5 tonnes, valued at € 861,300, in 2012 to 613,4 tonnes, valued at € 2,9 million, in 2015, increases of 176,9 percent and 236,5 percent in volume and value, respectively. As a share of total exports by EU Member States during 2012-2015, exports to Baltic countries grew in volume from 4,8 percent to 8,8 percent, and grew in value from 2,2 percent to 6,9 percent. Estonia led the way in terms of both the amount purchased from EU exporters and the rate of growth in its trade.

Table 89. Sturgeon roe: Baltic share of EU total exports					
	2012	2013	2014	2015	2012-2015
EU imports from:	----------Value in € 1.000----------				
Estonia	245,9	431,5	951,0	1.885,4	666,7%
Latvia	154,1	338,0	481,6	353,2	129,2%
Lithuania	461,3	701,6	536,8	659,3	42,9%
Subtotal	**861,3**	**1.471,2**	**1.969,4**	**2.898,0**	**236,5%**
Total EU imports	**38.536,3**	**40.924,5**	**42.912,3**	**42.104,0**	**9,3%**
Baltic share	2,2%	3,6%	4,6%	6,9%	
EU imports from:	----------Volume in tonnes----------				
Estonia	6,0	12,6	22,0	28,2	370,0%
Latvia	1,7	2,7	34,9	5,0	194,1%
Lithuania	11,8	14,5	16,4	20,8	76,3%
Subtotal	**19,5**	**29,8**	**73,3**	**54,0**	**176,9%**
Total EU imports	**409,2**	**315,5**	**735,6**	**613,4**	**49,9%**
Baltic share	4,8%	9,4%	10,0%	8,8%	

***Source**: Eurostat*

Market

The main sturgeon product in the EU market is **sturgeon roe**, or caviar. Sturgeon filets and other meat are marketed mainly in domestic market channels, and therefore do not enter in international trade statistics.

Total imports of sturgeon roe by EU Member States nearly doubled in volume from 2012 to 2014, before dropping sharply in 2015, for a net increase of 20,2 percent during 2012-2015. At the same time, import value fell by only 3,7 percent, owing to a net decline in average unit value during the period. Almost all imports from EU Member States come from other Member States, perhaps because average unit values of sturgeon roe from outside the EU can be more than ten times the unit value of EU-sourced sturgeon roe, which in turn is likely due to differences in quality or sturgeon species for roe coming from different sources.

Table 90. Sturgeon roe: EU Member State imports, by source					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				(%)
Intra-EU	18.798,6	21.908,6	20.815,3	19.584,2	4,2%
Extra-EU	7.963,2	8.934,8	11.087,8	6.189,0	-22,3%
Total	**26.761,8**	**30.843,4**	**31.903,1**	**25.773,2**	**-3,7%**
	----------Volume in tonnes----------				
Intra-EU	537,9	658,4	987,1	671,4	24,8%
Extra-EU	34,8	68,5	26,2	16,9	-51,4%
Total	**572,7**	**726,9**	**1013,3**	**688,3**	**20,2%**
	----------€ / kg----------				
Unit value					
Intra-EU	34,95	33,28	21,09	29,17	-16,5
Extra-EU	228,83	130,44	423,20	366,21	60,0
Average	46,73	42,43	31,48	37,44	-19,9%

***Source**: Eurostat*

The decline in prices for EU exports of sturgeon roe suggests some changes taking place in the market for caviar. One is an increase in supply of true caviar from sturgeon raised on farms: global supply from aquaculture grew by 20 percent in 2014-2015 alone. By itself, this would put downward pressure on prices. Another is an increase in supply of caviar substitutes, which also tends to lower the prices received by EU exporters of true caviar as well as substitutes. One estimate indicates that the roe from as many as 38 different fish species are currently used to make caviar substitutes.[79] However, falling prices attract consumers, and it appears that more and more consumers are choosing caviar than ever before. This is of interest to caviar exporters to the EU market.

The EU market for imported caviar during 2012-2015 grew in volume by 20,2 percent, from 573 tonnes to 688 tonnes. However, because prices declined, the value of such imports fell by 3,7 percent, from €26,8 million in 2012 to € 25,8 million in 2015. The average price or unit value of these imports in the EU market fell by 20 percent during this period, from 34,95 €/kg to 29,17 €/kg. However, these unit values are for imports from all sources; prices for imports from EU sources themselves fell by less than the average during 2012-2015, while prices for extra-EU imports rose sharply. This sharp price rise perhaps pushed consumer demand toward EU-produced sturgeon roe.

The major suppliers of sturgeon roe to the EU market include **Germany, China, Italy, France,** and the **United States.** EU Member State imports from these sources grew by 6,7 percent in volume and 8,9 percent in value during 2012-2015. As a share of total EU imports, supply from these sources fell in terms of volume but rose in terms of value.

Table 91. Sturgeon roe: Major suppliers of EU imports (value)

	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Germany	4.538	7.083	6.890	5.502	21,2%
China	4.452	5.394	7.737	3.770	-15,3%
Italy	2.807	3.450	4.417	3.870	37,9%
France	2.706	3.206	1.783	2.835	4,8%
United States	1.148	1.135	901	1.063	-7,4%
Subtotal	15.651	20.267	21.728	17.040	8,9%
Other	11.111	10.576	10.175	8.734	-21,4%
Total	**26.762**	**30.843**	**31.903**	**25.773**	**-3,7%**
Subtotal %	58,5%	65,7%	68,1%	66,1%	

***Source**: Eurostat*

[79] P. Bronzi and H. Rosenthal, "Present and future sturgeon and caviar production and marketing: A global market overview." Available at https://www.researchgate.net/publication/268882178_Present_and_future_sturgeon_and_caviar_production_and_marketing_A_global_market_overview [accessed Jul 25, 2017]

Table 92. Sturgeon roe: Major suppliers of EU imports (volume)					
	2012	2013	2014	2015	2012-2015
	----------Volume in tonnes----------				
Germany	240	271	252	316	31,6%
China	9	12	18	11	28,1%
Italy	52	19	85	13	-74,8%
France	45	55	26	31	-32,1%
United States	5	5	3	3	-38,8%
Subtotal	351	363	384	374	6,7%
Other	222	364	630	314	41,6%
Total	**573**	**727**	**1,013**	**688**	**20,2%**
Subtotal %	61,3%	49,9%	37,9%	54,4%	

***Source**: Eurostat*

The EU market for sturgeon roe exported by **Estonia, Latvia** and **Lithuania** declined during 2012-2015, in terms of both absolute value and volume terms as well as relative to the size of the EU sturgeon roe import market. EU Member State imports from these Baltic countries totalled 15,8 tonnes, valued at €577.200, in 2015, down by 46 percent in volume and 41 percent in value from 2012 imports of 29,3 tonnes valued at € 985.200. As a share of total imports by EU Member States during 2012-2015, purchases from Baltic countries fell in volume from 5,1 percent to 2,3 percent, and in value from 3,7 percent to 2,2 percent. This took place despite a massive increase in Estonian exports to other EU Member States during the period, which was more than offset by declines in shipments from Latvia and Lithuania. Average unit values for Baltic shipments to other EU importers rose across the board during 2012-2015, by an average of 8,7 percent.

Table 93. Sturgeon roe: Baltic share of EU total imports					
	2012	2013	2014	2015	2012-2015
EU imports from:	----------Value in € 1.000----------				
Estonia	13,1	25,5	32,8	88,3	574,9%
Latvia	213,3	299,0	279,0	185,5	-13,0%
Lithuania	758,8	492,2	527,6	303,4	-60,0%
Subtotal	**985,2**	**816,7**	**839,4**	**577,2**	**-41,4%**
Total EU imports	**26.761,8**	**30.843,4**	**31.903,1**	**25.773,2**	**-3,7%**
Baltic share	**3,7%**	**2,6%**	**2,6%**	**2,2%**	
EU imports from:	----------Volume in tonnes----------				
Estonia	0,5	0,5	0,5	3,1	520,0%
Latvia	10,4	11,9	18,8	8,4	-19,2%
Lithuania	18,4	16,5	21,7	4,3	-76,6%
Subtotal	**29,3**	**28,9**	**41**	**15,8**	**-46,1%**
Total EU imports	**572,7**	**726,9**	**1.013,3**	**688,3**	**20,2%**
Baltic share	**5,1%**	**4,0%**	**4,0%**	**2,3%**	

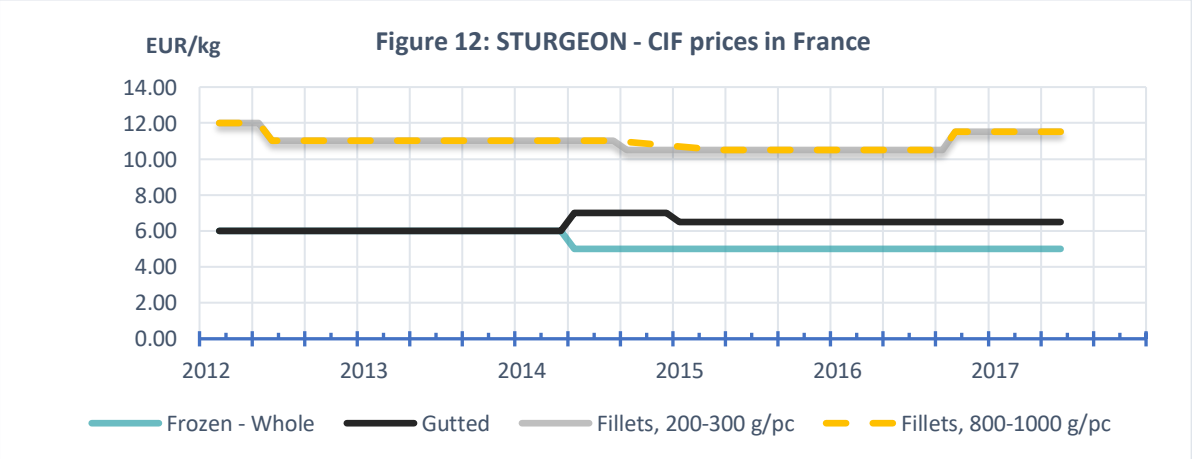
***Source**: Eurostat*

Sturgeon is marketed in an array of forms, as shown by the price and product list of a large UK on-line fish monger. Prices on a per-kg basis for some products include: 44,78 €/kg for medium fillet steaks; 67,17 €/kg for a skin-on fillet; 21,61-24,88 €/kg for various types of sturgeon in oil in jars; and 45,90 €/kg for sturgeon in a tin with truffles added.

Table 94. Sturgeon: Sample retail on-line prices in the United Kingdom					
Category	Product	Size	Price	Price/kg	Price/kg (euros)
SKINLESS FILLET STEAKS					
MEDIUM	2 fillet steaks	300g	£12,00	£40,00	€44,78
WHOLE FILLET SKIN ON	1 whole fillet	620g	£37,20	£60,00	€67,17
	1 jar natural sturgeon in oil	180g	£3,60	£20,00	€22,39
	1 jar smoked sturgeon in oil	180g	£4,00	£22,22	€24,88
SAVER PACKS	4 jars natural sturgeon in oil	720g	£13,90	£19,31	€21,62
	4 jars smoked sturgeon in oil	720g	£15,50	£21,53	€24,10
WITH CAVIAR	1 tin	100g	£4,10	£41,00	€45,90
	4 tins in a gift box	400g	£14,90	£37,25	€41,70
WITH GREEN PEPPER	1 tin	100g	£2,00	£20,00	€22,39
	4 tins in a gift box	400g	£11,90	£29,75	€33,31
WITH GREEN PEPPER CATERPACK	48 tins	4800g	£106,00	£22,08	€24,72
WITH TRUFFLE	1 tin	100g	£4,10	£41,00	€45,90
	4 tins in a gift box	400g	£14,90	£37,25	€41,70

Source: https://www,thefishsociety,co,uk/eating-experience/sturgeon/sturgeon-steaks,html

Sturgeon prices in France ("CIF" = Cost, Insurance & Freight, or the delivered price) were remarkably stable during 2012-early 2017. Prices for different products followed broadly the same stable trend, as would be expected with products such as whole fish being the main cost in processed products such as fillets. Prices of whole and gutted products were consistently about half the per/kg prices for fillets of different sizes.



Source: *European Price Report, Globefish*

Picture 6: Various sturgeon products from German aquaculture (from left to right: fresh sturgeon on the bone steak, sturgeon fillets, sturgeon in oil and smoked sturgeon)

***Source**: https://www,fischkaufhaus,de*

Sturgeon products are not commonly found in EU supermarkets. However, some products were found in some countries.[80] Whole (or usually, gutted) sturgeon were found in **Latvia** (priced at € 14,85) and **Lithuania** (priced between € 9,39 and € 11,09). Smoked sturgeon was also found in **Lithuania** (€ 16,99), and sturgeon prepared in jelly was observed in **Estonia** (ranging in price from € 23,90 to € 30,36). Caviar was found in a store in **Denmark** (priced in the range of € 1.339,52-2.463,78).

[80] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

Tilapia *(Tilapia spp., Oreochromis spp.)*

Tilapia spp.

Oreochromis spp

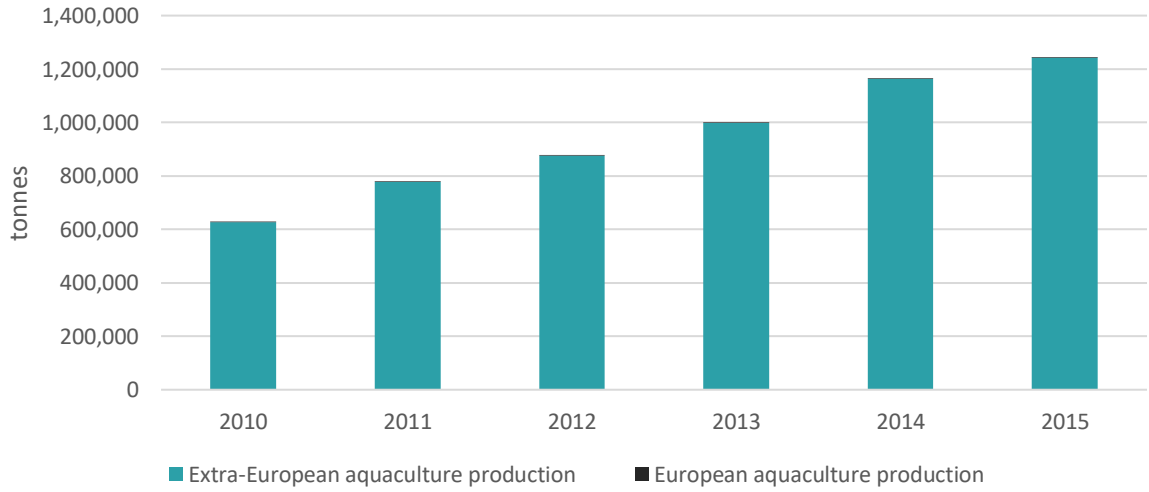
Introduction

Tilapia is the common name for group of dozens of species of cichlid fish (which include a variety of fish types). Tilapia are mainly freshwater fishfound in shallow streams, ponds, rivers and lakes and less commonly found living in brackish water. Historically, they have been of major importance in artisanal fishing in Africa, where tilapia farming dates back to ancient Egypt. Today tilapia are of increasing importance in aquaculture in many parts of the world. The commercial popularity of tilapia came about due to its low price, easy preparation, and its mild taste.

Production

Tilapia is one of the commonly farmed species in the world. The current aquaculture production of tilapias is about 1.2 million tonnes, the great bulk of which takes place in Asia, accounting for nearly 80 percent of the total world production. In 2015, **Bangladesh** was the country with the largest production of farmed tilapia (324.000 tonnes), followed by **Vietnam** (283.000 tonnes) and **Brazil** (219.000 tonnes). It is important to note that tilapia farming in **Africa** and **South America** is also increasing. Many countries experienced a high increase in their production of tilapia in the past decade. The success of tilapia farming can be primarily attributed to the relative ease of culture under extensive, semi- and/or intensive practices, and thus relatively less limited by the economic status of the farmer compared to most other finfish species. Tilapia has relatively high growth rate, wide range of tolerance to physicochemical characteristics, resistance to disease, moderately high dress-weight ratio, long shelf-life and a mild taste[81].

Figure 13: Aquaculture production of tilapia



***Source**: FishstatPLUS, FAO*

[81] "Tilapia as alien aquatics in Asia and the Pacific": aquaculture of tilapias, FAO

Table 95. Extra-EU aquaculture production (tonnes)						
	2010	2011	2012	2013	2014	2015
Total	**627.952**	**778.190**	**875.743**	**997.385**	**1.162.686**	**1.243.779**
Bangladesh	24.823	104.716	123.712	209.650	283.937	324.336
Vietnam	121.196	172.666	196.571	215.635	244.483	282.978
Brazil	155.451	166.913	182.297	169.306	199.948	219.329
Other	326.482	333.895	373.163	402.794	434.318	417.136

Source: *FishstatPLUS, FAO*

Official statistics show almost no registered production of tilapia in Europe, and it is likely that such data is recorded as "other fish." Based on information from industry sources, it is estimated that European production of tilapia is on the level of 2.000 tonnes. At present, the largest tilapia farm in Europe produces around 1.000 tonnes (located in Poland) and the second largest around 150 tonnes (located in the UK)[82]. The tilapia farm in Poland has become the world's first recirculated aquaculture system for tilapia to achieve Aquaculture Stewardship Council (ASC) certification[83].

Tilapia production started in Europe in the Netherlands and Belgium in the early 1980s, and since then several enterprises have tried to farm tilapia with many attempts and failures. Tilapia is produced in closed recirculation systems, where fish swim in tanks and 95% of water is recirculated on a daily basis. Production of tilapia is currently ongoing in **Latvia** where the species is farmed in water basins and recirculation systems. In 2015, Latvian enterprises produced 4,6 tonnes of tilapia in water basins and 400 kg in recirculating systems.

In addition to the farmed production, significant volumes of tilapia are provided from inland catch. In 2015, nearly 390.000 tonnes of tilapia were caught in inland waters, where the largest volumes came from Mexico (83.500 tonnes), Nigeria (57.400 tonnes) and Philippines (50.500 tonnes). In addition, some 1.600 tonnes of wild tilapia from marine waters is caught in Senegal, as well as minor volumes in Gambia and Gabon.

Table 96. Extra-EU inland production of tilapia (in tonnes)						
	2010	2011	2012	2013	2014	2015
Total	**379.163**	**396.071**	**384.513**	**388.333**	**410.790**	**388.492**
Mexico	62.433	64.945	55.795	69.977	71.952	83.476
Nigeria	56.632	57.984	59.945	65.560	68.763	57.423
Philippines	44.896	45.784	47.439	48.938	54.180	50.474
Other	215.202	227.358	221.334	203.858	215.895	197.119

Source*: FishstatPlus, FAO*

[82] "Tilapia production in Europe", by Øystein Falch of Inocap, Norway and members of the Seafood Consultants Network, December 2013.
[83] "Tilapia farm takes Pole position", www.fishfarmingexpert.com

Trade

International trade in tilapia is reported in the Combined Nomenclature (CN) of the European Union Common Custom Tariff Schedule (corresponding to the Harmonized Tariff Schedule (HTS) of other WTO Members) under CN headings 0302, 0303, and 0304.

EU Combined Nomenclature: Provisions for tilapia

0302 and 0303 – Tilapia, excluding fillets and other fish meat:
0302 71 00 – – Fresh or chilled
0303 23 00 – – Frozen

0304 – Tilapia fillets and other fish meat (whether or not minced):
0304 31 00 – – Fresh or chilled
0304 61 00 – – Frozen

Most countries in Asia that produce tilapia channel their production to domestic or regional markets. China, Vietnam and Thailand are the largest suppliers of tilapia products to the European market on the Extra-EU level, while inside the EU, the Netherlands, Belgium and Poland are the largest exporting/trading countries of tilapia. The major share of Intra-EU exports of tilapia is by far represented by re-export of tilapia originally imported from China, Vietnam, Thailand and Indonesia, with an exception of some trade volumes of tilapia produced in the EU countries.

China is the largest exporting country of tilapia products to the European market with over 20.000 tonnes in 2015. In that year, Chinese exports of tilapia to the EU market amounted to 9.650 tonnes of frozen whole tilapia and 11.520 tonnes of frozen tilapia fillets. Exports of both categories followed a decline in 2012-2015, while **Vietnam** increased its export of tilapia products to the EU market significantly in the same period, being the second largest exporter of tilapia to the EU after China. **Thailand** is another large exporter of frozen tilapia to the EU, as well as **Indonesia** in regards of frozen tilapia fillets. The total Extra-EU import of frozen whole tilapia amounted to 12.830 tonnes in 2015, keeping the stable level of import volume in 2012. In contrast, due to increasing consumer demand, the total Extra- EU import of frozen tilapia fillets reached 16.600 tonnes, increasing 5% over 2012.

Table 97. Extra-EU imports of tilapia (in tonnes)

		2012	2013	2014	2015
Frozen tilapia	China	10.352	12.465	8.832	9.651
	Thailand	1.589	394	1.916	1.475
	Vietnam	256	687	1.397	1.285
	Indonesia	346	559	528	366
	India	118	97	144	33
	Myanmar (Burma)	22	0	24	22
	Sub-total	**12.686**	**14.204**	**12.843**	**12.834**
Frozen fillets	China	13.964	16.014	12.159	11.525
	Vietnam	134	980	3.273	3.309
	Indonesia	1.340	1.902	2.093	1.393
	Malaysia	111	55	0	178
	Thailand	175	214	212	116
	Taiwan	24	20	67	67
	Costa Rica	20	15	44	31
	Sub-total	**15.770**	**19.202**	**17.850**	**16.622**

***Source**: Eurostat*

Intra-European trade of tilapia products followed diverse trends in 2012-2015. While the trade of both fresh and frozen whole tilapia increased significantly, the trade of tilapia fillets followed a more stable pattern of development, apparently due to the fact that delivery of fresh whole tilapia was attributed to the domestic EU production where farming enterprises traded tilapia mostly as whole fish.

The highest increase was observed in Intra-EU exports of whole fresh tilapia, which reached 2.430 tonnes in 2015, from 800 tonnes in 2012. In the same period, Intra-EU exports of whole frozen tilapia increased more than two fold reaching nearly 3.900 tonnes. The main growth in trade was attributed to the exports of tilapia traded from the Netherlands and Belgium, which represented trading hubs for tilapia products, in addition to small volumes of domestic production during that period. The Netherlands re-exported frozen tilapia products mostly to Germany and Austria, while Belgium re-directed tilapia products to the Netherlands and France. Re-exports of fresh tilapia fillets from the Netherlands were mainly destined to Italy, Germany and Romania.

Table 98. Intra-EU exports of tilapia products (fresh and frozen tilapia, tonnes)

		2012	2013	2014	2015
Fresh tilapia	Netherlands	189	445	420	1.925
	Greece	110	28	1	131
	France	226	93	74	116
	Italy	110	88	84	94
	Spain	21	32	76	48
	Germany	22	51	51	24
	Denmark	36	19	13	24
	Portugal	5	3	0	17
	Sweden	13	28	10	16
	Other	69	33	19	34
	Total	**806**	**823**	**752**	**2.432**
Frozen tilapia	Belgium	773	1.622	1.637	1.488
	Netherlands	406	1.006	924	1.027
	Poland	194	320	219	669
	United Kingdom	19	17	18	252
	Germany	30	402	201	177
	Czech Republic	0	62	46	66
	Denmark	37	40	42	66
	France	39	40	16	57
	Sweden	1	0	1	23
	Other	38	31	29	80
	Total	**1.539**	**3.545**	**3.136**	**3.908**

***Source**: Eurostat*

In contrast with whole tilapia, Intra-EU trade of fresh and frozen tilapia fillets followed different trends where Intra-EU supply of fresh tilapia fillets significantly decreased and supply of frozen tilapia fillets remained stable. In 2012-2015, Intra-EU export of fresh tilapia fillets went down from 2.290 tonnes to 1.660 tonnes, and Intra-EU export of frozen tilapia fillets stabilized at 2.890 tonnes. The largest declines

in supply of tilapia fillets occurred in shipments from the Netherlands and Belgium for fresh fillets and Belgium for frozen fillets.

Table 99. Intra-EU suppliers of tilapia products to the EU market (tonnes)					
		2012	2013	2014	2015
Fresh fillets	Netherlands	736	630	523	408
	Belgium	463	1 157	771	326
	United Kingdom	130	113	145	187
	Denmark	160	120	173	183
	Poland	21	8	16	129
	Spain	83	30	17	104
	Germany	225	438	89	99
	Greece	43	59	77	77
	Latvia	10	22	43	48
	Czech Republic	3	8	18	45
	Portugal	10	6	6	18
	France	304	125	60	13
	Other	96	67	108	21
	Total	**2.290**	**2.788**	**2.052**	**1.662**
Frozen fillets	Netherlands	491	1 287	1 131	969
	Germany	669	515	370	625
	Poland	213	419	477	486
	Belgium	422	530	372	336
	Denmark	227	269	321	187
	Portugal	101	134	109	80
	Slovakia	0	2	1	59
	Lithuania	64	45	34	42
	United Kingdom	447	385	166	37
	Spain	37	51	25	32
	Latvia	29	29	24	14
	Other	107	86	26	18
	Total	**2.812**	**3.758**	**3.060**	**2.889**

***Source**: Eurostat*

The trade value of tilapia products in Baltic country exports to the EU followed a general increasing trend in 2012-2015, while in terms of volume it followed a decreasing trend. Exports of all tilapia products from Estonia, Latvia and Lithuania declined from 166 tonnes to 111 tonnes in that period, while the export value increased from €534.000 to €558.000. Latvia was the largest exporter of tilapia products, with over half of both volume and value of tilapia exports from the Baltic countries to the EU.

Table 100. Tilapia, all products: Baltic exports to the EU					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Estonia	231.736	342.783	238.854	56.321	-75,7%
Latvia	104.948	146.425	319.753	341.065	225,0%
Lithuania	197.055	333.611	152.866	160.185	-18,7%
Subtotal	533.739	822.819	711.473	557.571	4,5%
Global exports to the EU	**91.901,83**	**116.908,6**	**114.351,8**	**113.130,8**	**23,1%**
Baltic export share	0,6%	0,7%	0,6%	0,5%	
	----------Volume (tonnes)----------				
Estonia	52	50	27	1,3	-97,5%
Latvia	40	51,9	67,6	63,1	57,8%
Lithuania	73,7	125	44,9	46,9	-36,4%
Subtotal	165,7	226,9	139,5	111,3	-32,8%
Global exports to the EU	**36.274,8**	**44.819,4**	**40.102,1**	**40.419,9**	**11,4%**
Baltic export share	0,5%	0,5%	0,3%	0,3%	

***Source**: Eurostat*

Market

In Asia, tilapia is usually traded in live or fresh/chilled form, and consumed mostly as whole fish. In the past decade, tilapia has also became widely available in other forms, namely fillets and steaks. In addition, such by-products of tilapia as bones and heads are popular on domestic markets in Asia.

In Europe, tilapia is preferred as both whole fish and as fillets. In 2015, the total European imports of tilapia amounted to 29.500 tonnes supplied from Extra-EU countries and 10.700 tonnes of tilapia supplied from Intra-EU trade (over 95% of the Intra-EU traded volume is represented by tilapia of Asian origin). Compared to the previous year, European imports of tilapia from the main producing countries in Asia declined by 7%; however, compared to 2012, the overall volume of tilapia imported by the EU increased 5%. The overall structure of the EU imports was comprised approximately of 50% frozen fillets, 44% whole frozen and a small volume of fresh tilapia fillets.

In 2015, the average import prices into the EU declined significantly with frozen fillet prices taking a large dip (-14.4%) to 3,48 USD/kg while whole frozen tilapia prices declined by 8.4% to 1,91 USD/kg[84]. In the whole frozen category, import prices for supplies from Viet Nam, Bangladesh and Taiwan Province of China (the latter only for premium quality products) strengthened.

France is the largest market for frozen tilapia in Europe, with the current estimated size of 3.000 tonnes. In 2015, French enterprises imported 2.700 tonnes of frozen tilapia, increasing from 825 tonnes in 2015. The country also imported about 100 tonnes of fresh fillets and 105 tonnes of frozen fillets and about 20 tonnes of fresh whole tilapia.

[84] Globefish market report – Tilapia 2016

Table 101. European importers of tilapia products (tonnes)					
		2012	2013	2014	2015
Fresh tilapia	Belgium	28	50	34	45
	Germany	18	18	6	35
	Portugal	10	6	18	34
	France	55	67	24	22
	Luxemburg	3	2	2	6
	Netherlands	35	15	0	4
	Greece	3	7	0	4
	Other	21	17	5	9
	Total	**177**	**186**	**93**	**162**
Frozen tilapia	France	825	2 083	2 299	2 704
	Netherlands	509	1 057	680	707
	Germany	395	487	465	568
	Belgium	190	239	271	272
	Sweden	51	150	141	185
	Spain	74	74	100	121
	Greece	16	14	11	118
	Ireland	146	94	100	99
	Italy	7	35	50	92
	Denmark	55	58	64	67
	United Kingdom	22	90	117	64
	Other	177	210	179	204
	Total	**2.472**	**4.597**	**4.480**	**5.207**

***Source**: Eurostat*

Poland and **Germany** are some of the largest EU markets for frozen tilapia fillets. In 2015, Germany imported about 1.400 tonnes of tilapia products, consisting mainly of frozen whole tilapia (570 tonnes), fresh tilapia fillets (440 tonnes) and frozen fillets (430 tonnes). German imports of frozen whole tilapia and fresh fillets increased significantly in 2012-2015, especially the category of fresh fillets, however, German imports of frozen fillets followed the declined trend. In addition to its own domestic production, Poland imported about 160 tonnes of fresh tilapia fillets and 130 tonnes of frozen tilapia fillets in 2015. While the country significantly lowered its imports of frozen tilapia fillets, its imports of fresh tilapia fillets have been on the rise in 2012-2015.

Signs of an emerging consumer demand for tilapia products have been observed in **Austria,** which doubled its imports of tilapia products in the same period. Austrian imports of frozen tilapia fillets reached 450 tonnes in 2015, having a positive demand from the side of consumers.

Table 102. European importers of tilapia products (tonnes)					
		2012	2013	2014	2015
Fresh fillet	Germany	169	76	154	437
	Romania	323	369	472	372
	Italy	39	29	40	221
	Poland	24	3	95	163
	Sweden	203	254	162	158
	Belgium	48	164	101	114
	Malta	48	69	79	111
	France	243	79	37	98
	Finland	9	16	21	70
	Denmark	75	5	5	59
	Austria	16	18	32	57
	Other	191	136	2 19	397
	Total	**1.391**	**1.225**	**1.423**	**2.261**
Frozen fillet	Austria	248	496	524	481
	Spain	139	375	402	366
	Germany	871	721	848	327
	Hungary	22	104	101	238
	Slovakia	64	77	166	200
	Czech Republic	189	238	132	185
	Netherlands	641	905	569	164
	Denmark	22	100	210	150
	Poland	356	180	79	130
	Slovenia	20	85	106	129
	Italy	172	200	163	124
	France	288	313	172	105
	Estonia	54	108	114	89
	Belgium	71	66	64	89
	United Kingdom	55	33	69	73
	Lithuania	74	96	91	68
	Latvia	81	147	89	67
	Other	123	114	165	152
	Total	**3.497**	**4.365**	**4.071**	**3.145**

***Source**: Eurostat*

Imports of all tilapia products into the **Baltic countries** followed an upward trend increasing from 284 tonnes in 2012 to 330 tonnes in 2015. In terms of value, it went up from € 736.000 to € 1 million in the respective period. **Lithuania** was the largest importer of tilapia products responsible for nearly half of import volume and value, followed by **Estonia** and **Latvia.**

Table 103. Tilapia, all products: Baltic imports from the EU					
	2012	2013	2014	2015	2012-2015
	----------Value in € 1.000----------				
Estonia	262,508	390,706	384,616	308,283	17,4%
Latvia	208,665	456,435	309,594	236,087	13,1%
Lithuania	265,06	572,946	519,933	515,899	94,6%
Subtotal	736,233	1420,087	1214,143	1060,269	44,0%
Total EU supply	**27.919,76**	**36.483,21**	**34.431,82**	**32.456,52**	**16,2%**
Baltic import share	2,6%	3,9%	3,5%	3,3%	
	----------Volume in tonnes----------				
Estonia	102,9	130,7	122,5	97,2	-5,5%
Latvia	82,4	152,5	97,3	75	-9,0%
Lithuania	98,3	201	136,1	158,3	61,0%
Subtotal	283,6	484,2	355,9	330,5	16,5%
Total EU supply	**8 345,3**	**1 1243**	**10 513,1**	**10 999,6**	**31,8%**
Baltic import share	3,4%	4,3%	3,4%	3,0%	

***Source**: Eurostat*

Analyzing consumer demand and development of tilapia trade on the European market, it is noticeable that market penetration of tilapia have been far less dynamic compared to other markets, and especially the USA, where the market for tilapia is approximately 8 times higher than in Europe. According to industry sources and analysis of trade data, the European market for tilapia imports has been quite stagnant due to the **high competition** based primarily on price with other species originating from Asia. In particular, pangasius is regarded as one of the main competing species for tilapia due to the lower import prices for pangasius. At the same time, tilapia competes with other whitefish species such as cod and Alaska pollock.

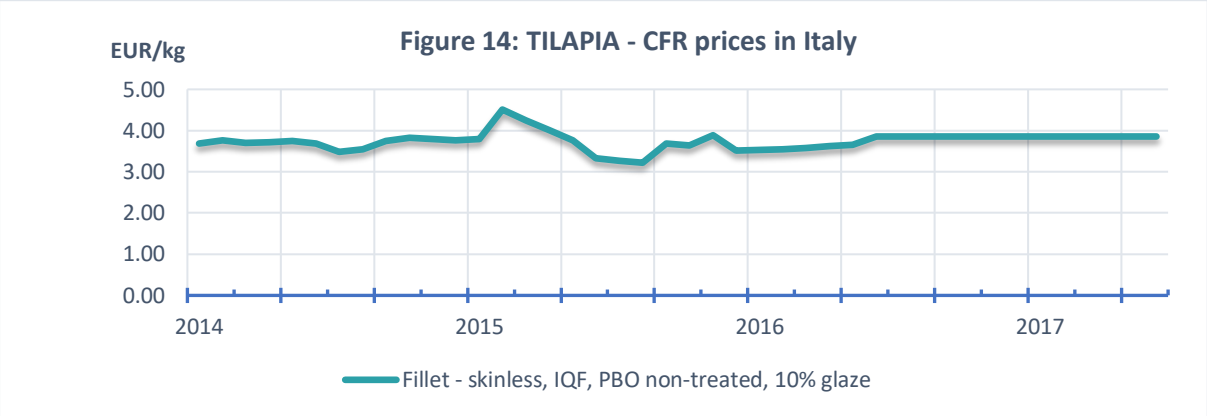
Another reason for slower consumer demand for tilapia has been the effects of **lower quality** tilapia which was exported to the EU market several years ago, resulting in weakening image of the species. It is expected that consumption of tilapia in Europe will tend to stay on the current level with possible slight increase. The retail sales have so far been mostly limited to smaller ethnic minority's stores, however some larger retail chains introduced sales of tilapia. In the Ho-Re-Ca sector, tilapia is mainly sold in lower-budget restaurant and catering outlets.

Nevertheless, despite the mixed trends of the overall consumer demand, the demand for **premium tilapia** is reported to be promising. In the past few years, EU buyers have tended to purchase more tilapia from sources other than China. This is reflected in the higher imports of frozen tilapia fillets from Indonesia, Malaysia, Thailand and Taiwan Province of China. Frozen tilapia fillets from these countries are known to be premium quality meaning higher prices when compared to imports of frozen fillets from other origins. Average import prices of frozen tilapia fillets in 2016 from these sources were 6,20 USD/kg (Indonesia), 6,10 USD/kg (Thailand) and 13,30 USD/kg (Taiwan)[85]. The EU market looks positive for premium tilapia products, although this product may not develop into a significant traditional market because of its niche position.

[85] Tilapia - Globefish market report, 2016

Another trend for tilapia has been the introduction of **ready-to-eat** tilapia products, following the overall growth in consumer demand for ready-to-cook and ready-to-eat products. Pre-cooked and marinated tilapia are increasingly offered in addition to traditional tilapia fillets and whole fish.

Development of tilapia CFR prices on the Italian market has been stable since the second half of 2016 and 2017 where frozen skinless tilapia fillet were priced at 3,85 €/kg. The price peak for that product was observed in the first quarter of 2015 where it reached 4,50 €/kg with a downward tendency in the following months.



***Source**: European Price Report, Globefish, 2017*

Tilapia products can be observed in EU retail outlets in fillet form, both fresh and frozen.[86] Fresh fillets were found in the **Netherlands** priced between €14,98 and €22,22. Frozen tilapia fillets were found in stores in **Hungary** (€8,76-11,05), the **Netherlands** (€9,67-10,62), **Belgium** (€10,47), **Lithuania** (€8,95), and **Poland** (€7,93).

The retail prices of tilapia products from the UK fishmonger store are on the similar level of other European markets. The price of fresh tilapia fillets start from GBP 2,30 per 240g (€ 10 per kg) of two small fillets or GBP 3,70 per 320g (€ 11 per kg) of two medium-size fillets[87].

Picture 7: Tilapia fillets marketed by a UK fishmonger

***Source**: The Fish Society UK*

[86] A range of stores in the domestic markets were surveyed during the 3rd quarter of 2017. All prices given here are expressed in euros/kg equivalent, regardless of actual product size.

[87] https://www.thefishsociety.co.uk/suprafishlong/tilapia/tilapia-fillets.html

PART 3: Conclusions

Market trends for selected species in the EU

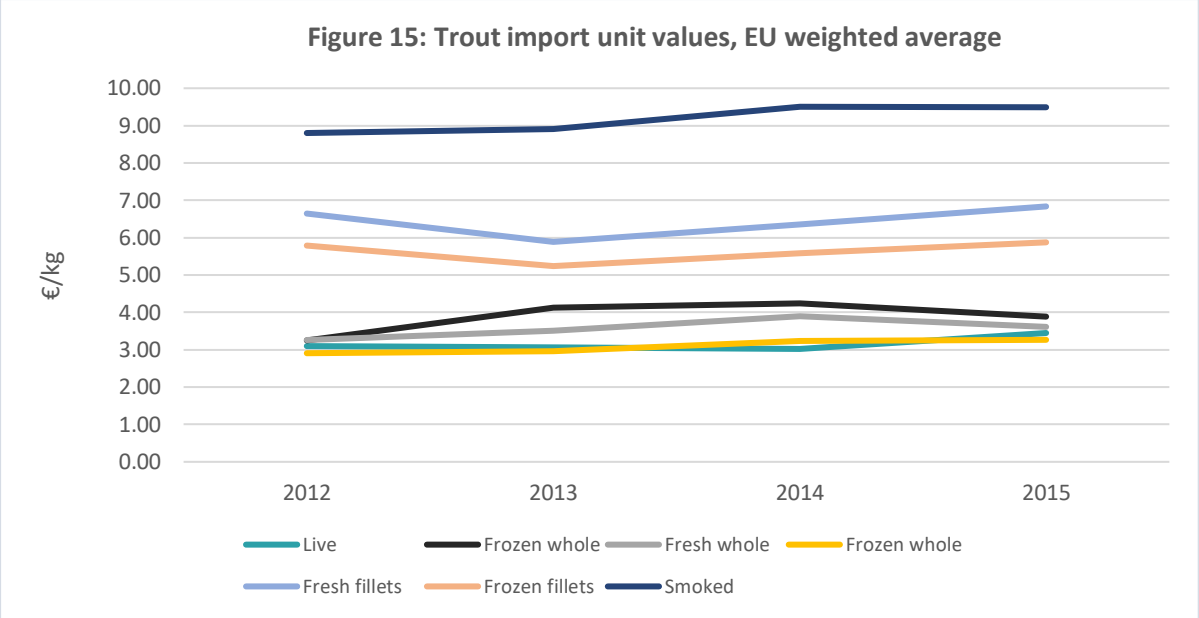
Comparative analysis of trade tendencies for selected freshwater species on the European market has shown areas for growth for the species on various markets. Evaluation of the trends and growth opportunities was based on development of trade and weighted average import value units for selected freshwater species. Although the trade dynamics of each species are individual, some species, such as **rainbow trout** and **carp**, have demonstrated a positive growth in most product forms traded on the EU market, in addition to large and consistent production volumes. Some species, such as **Arctic char, perch** and **pike-perch** meet a high consumer demand on several markets, however, their limited production sets bounds for further market expansions. Stable market development is expected for other species such as **catfish** and **tilapia,** with growing emerging product forms traded on new markets. Good market opportunities are expected for several freshwater species such as **European and red claw crayfish,** provided consistent supply on the markets. Decreasing trade of **eel** products is due largely to the endangered status of the species,and the limits on production are reflected in declining markets.

Rainbow trout

Considering the tendencies of trade of selected aquaculture species in the EU, several distinct growing trends have been observed for **rainbow trout** on nearly all main EU markets for the species.

In 2012-2015, the Intra-EU imports of rainbow trout increased most compared to all other freshwater species, growing 49% in value and 35.4% in volume. All major markets in the EU showed rising imports of trout from the EU Member States, especially in Poland, Estonia, Finland, Germany, and Austria.

The EU import value of nearly all categories of trout products followed an upward trend especially for fresh and chilled whole and filleted trout. However, the import value of frozen trout fillets was stable.



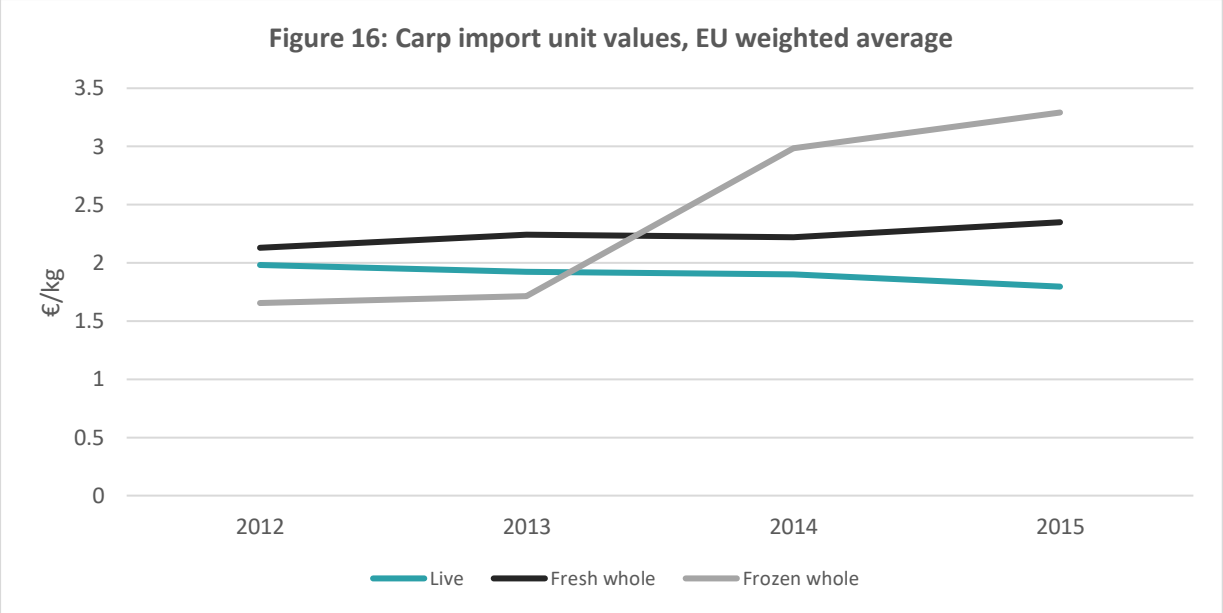
***Source**: based on elaborations from Eurostat*

The weighted unit value of trout products of the EU imports was up for all trout products imported into the EU. The highest unit value was achieved for smoked trout products (9,50 €/kg), followed by fresh trout fillets (6,84 €/kg), frozen trout fillets (5,88 €/kg), fresh whole trout (3,89 €/kg), frozen whole trout (3,61 €/kg) and live trout (3,45 €/kg). The highest growth of the weighted average import unit value in 2012-2015 was observed for fresh whole trout (19%), live trout (11%), and frozen whole trout (10%).

Carp

As with trout, the European trade of **carp** continued to follow a dynamic pattern with growing tendencies on the main European markets.

Although Germany, one of the largest and traditional markets for carp, did not increase its imports of carp in 2012-2015, keeping the stable volume of imports, other emerging markets such as Romania, and Austria showed a growing demand for various carp products. Poland and the Czech Republic continued to be other traditional markets for carp with stable demand for carp products.



***Source**: based on elaborations from Eurostat*

The weighted average unit value for carp products is relatively low compared to other species. However, import unit value grew in 2012-2015 for several categories like frozen whole carp (+99%) and fresh whole carp (+10.3%), while for live carp the import unit value was down 9.4%. Frozen whole carp had the highest weighted average import value (3,29 €/kg), followed by fresh whole carp (2,35 €/kg) and live carp (1,80 €/kg).

Arctic char

The trade of **Arctic char** on the EU markets remains limited since the production of the species from the aquaculture and the wild is far below the consumer demand. If there is increased production of the species, growing trade of all product categories is expected in both traditional and modern retail formats on the main markets for Arctic char. At present, the UK represents the largest market for fresh whole Arctic char in the EU, while Germany is the largest market for fresh Arctic char fillets.

European perch

Consumer interest and demand for **European perch** is also highly evident on the traditional markets for the species. Due to the limited production and distribution of the product, it is expected a higher absorption and potential of European perch on the main markets, such as Switzerland, eastern part of France, Northern Italy, Germany and Austria.

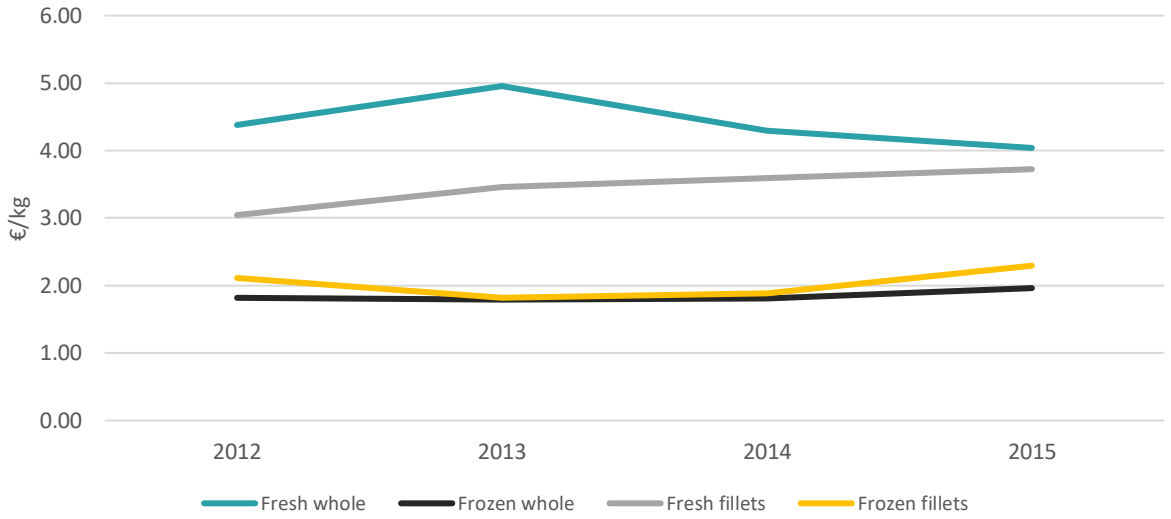
Catfish

European import of catfish species has been generally declining on the main EU markets, decreasing 15.4% in value and 21.7% in volume in 2012-2015. Nearly all the major EU markets, except Spain, reduced their imports of catfish species. The highest declines in terms of volume were observed in Austria (-57%) and Germany (-43%), followed by France (-30%) and the Netherlands (-9%). North African catfish and European Wels catfish, which are included in the trade statistics together with other catfish

species, are usually sold in another market segment than pangasius, however, a lack of separate trade statistics does not allow distinguishing separate trends for those species. A further increase of catfish markets is unlikely given the relatively weak positioning of catfish species, including pangasius.

The weighted average unit value for all catfish species in the EU imports declined for fresh fillets (-8%), while the weighted average import unit value rose for other product categories such as fresh fillets (22.3%), frozen fillets (8.6%) and frozen whole catfish (7.7%). Catfish in fresh, whole form had the highest weighted average import unit value (4,04 €/kg), followed by fresh fillets (3,72 €/kg), frozen fillets (2,29 €/ kg) and frozen whole catfish (1,96 €/kg).

Figure 17: Catfish import unit values, EU weighted average

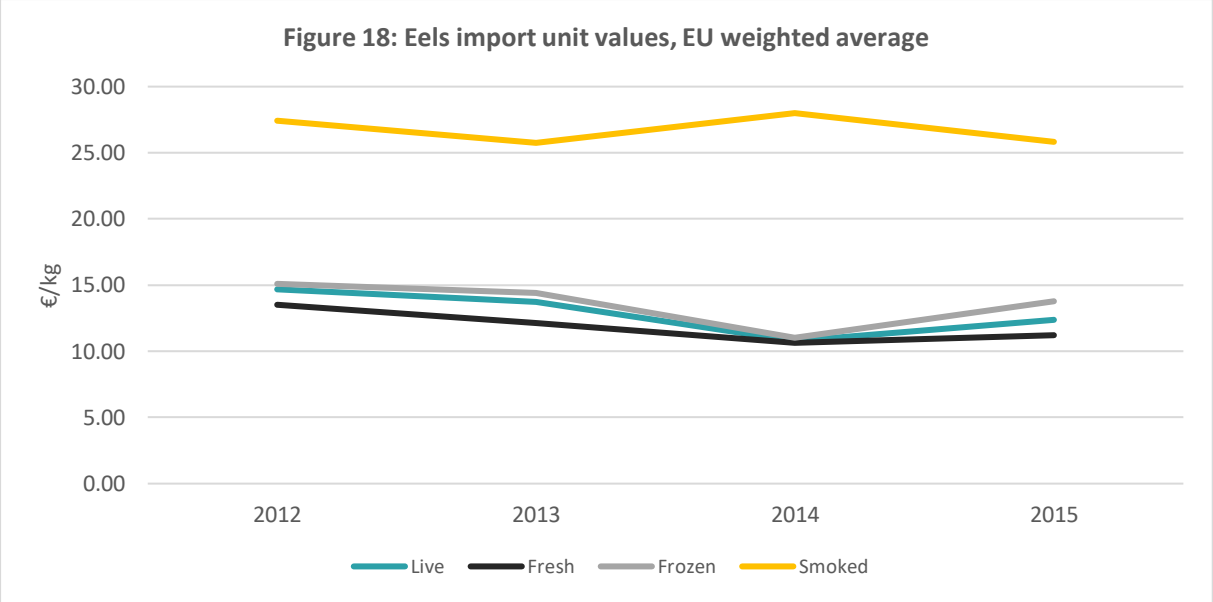


***Source**: based on elaborations from Eurostat*

Eel

The trade prospects for eel products are limited because the trade of eel has been negatively affected by the irregular trend of supply and the endangered status of the species. As a result, nearly all Intra-EU exports declined in 2012-2015 in several product categories and on many European markets. In 2012-2015, Denmark (-68%), Germany (-43%), Italy (-39%), the UK (-36.2%) and the Netherlands (-25.5%) experienced the largest declines in their import value of eel products, whereas Spain (80%) and Poland (34%) had the largest increases in import value of eel products. The situation for the traditional markets for eel products, such as Denmark, Germany and the UK, is also characterized by difficulties in acceptance of product by modern retail chains, in addition to the lack of consistent product volume.

The weighted average import unit value for eel products in the EU has followed a declining trend for all product categories in 2012-2015. The greatest decreases were noted for fresh and chilled eel (-17%), live eel (-15.8%), frozen eel (-8.7%) and smoked eel (-5.9%). The highest weighted average import unit value was achieved for smoked eel (25,82 €/kg), followed by frozen eel (13,78 €/kg), live eel (12,36 €/kg) and fresh and chilled eel (11,22 €/kg).

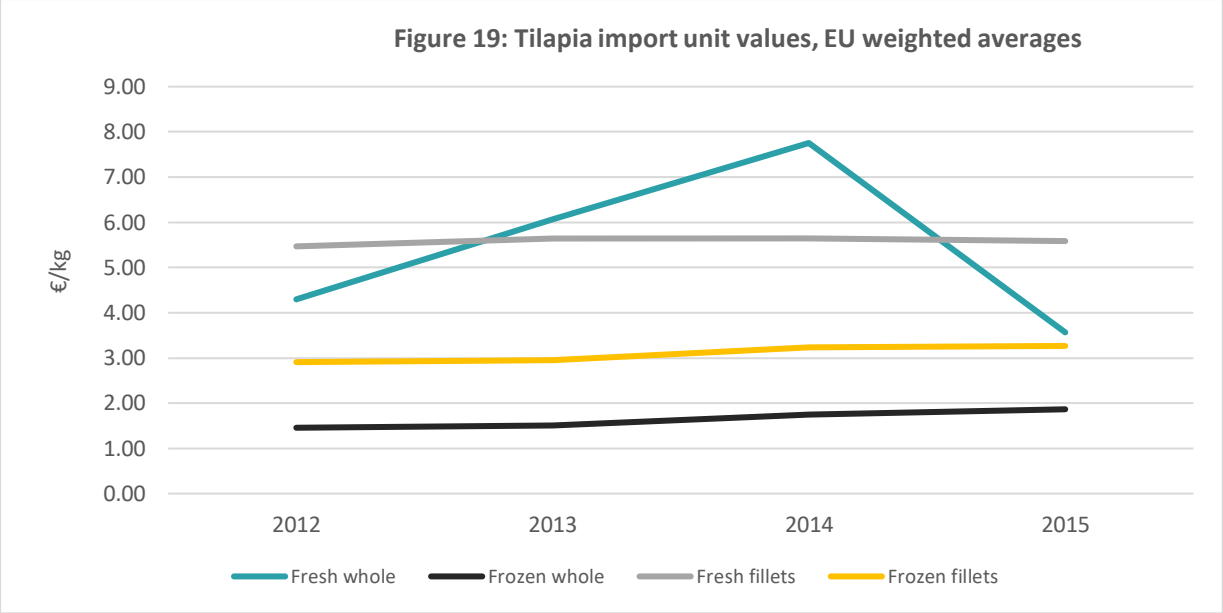


***Source**: based on elaborations from Eurostat*

Tilapia

Tilapia trade has been considered as stable without a distinctive growth trend from Extra-EU countries; however, Intra-EU trade of tilapia is on the rise. The largest markets for tilapia, such as France, Germany and Poland, have followed growing trends in their import of the species. In addition, a shift in the product categories from whole fish to fillets on several markets has provided an opportunity for adjustment to consumer demand and the requirements from the side of retailers. Emerging markets, like the UK and Austria, showed indications of increasing consumer demand for various product categories of tilapia. Therefore, despite the existing market obstacles such as competition with other species and quality issues in the past years, the market prospects for tilapia are likely to be good, provided increased quality and targeted marketing of the species.

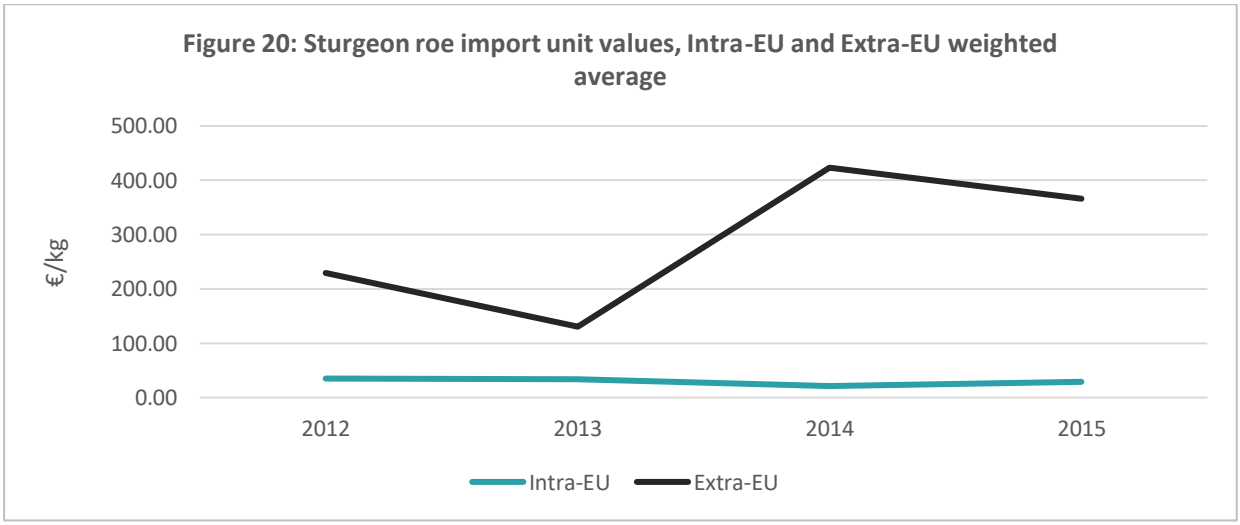
In 2012-2015, the weighted average import unit value for tilapia was up 28% for frozen whole fish, 12.3% for frozen fillets and 2% for fresh fillets. In contrast, the weighted average import unit value for fresh whole tilapia dropped by 17.1% during the same period. In 2015, fresh tilapia fillets reached the highest weighted average import unit value (5,58 €/kg), followed by fresh whole tilapia (3,57 €/kg), frozen fillets (3,27 €/kg) and frozen whole tilapia (1,87 €/kg).



***Source**: based on elaborations from Eurostat*

Sturgeon

The trade of sturgeon roe or caviar refers to a **special product niche**, which is attributed to the premium segment on the EU and other markets worldwide. EU imports of caviar grew in volume (20.2%), however, the import prices fell by 3.7%. Germany, France and Italy are considered as the main markets for the sturgeon roe in the EU, followed by the USA, Japan and Switzerland. Whereas the value of imports on those key markets declined due to the decreased import volumes in 2012-2015, the average import unit value in to the EU was on the rise, especially from Extra-EU countries.



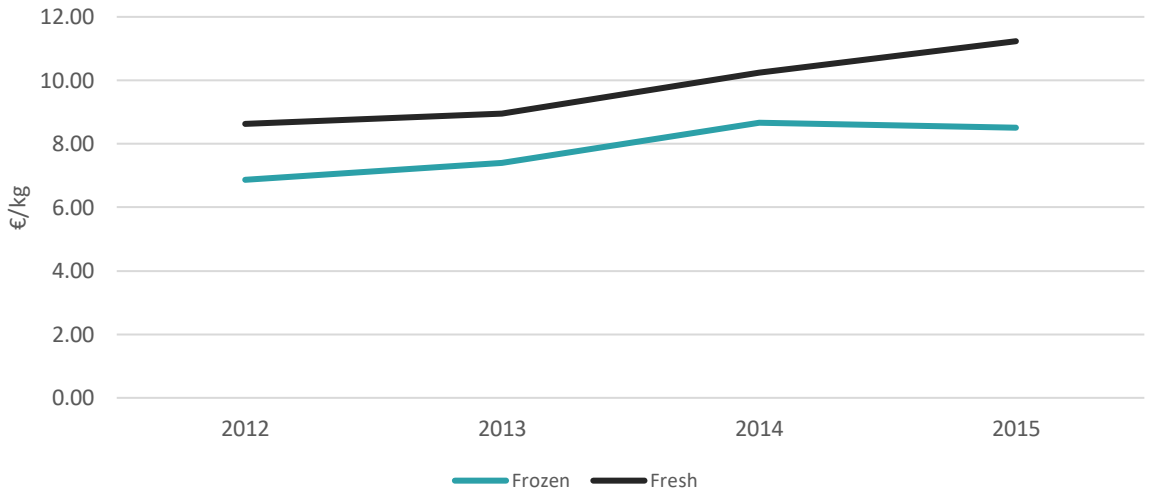
***Source**: based on elaborations from Eurostat*

The weighted average import unit value for sturgeon roe was the highest from Extra-EU countries with 366 €/kg, while from Intra-EU countries it was 29,17 €/kg, which is explained by the differences in quality of sturgeon species for roe coming from different geographic regions and different sturgeon species.

Crayfish

High consumer demand and market potential of some traditional markets for crayfish in the EU create good opportunities for European trade of crayfish at the current prices. However, the shortage of production create risks with projected export earnings, which have been reflected with the declining trends on the major European markets for freshwater crayfish products. The limited supply and exports resulted in the decreased volume and value of crayfish products in France, Germany and Belgium, while the Spanish and Romanian markets increased their import value of crayfish products in 2012-2015. In the same period, the weighted average import unit value for crayfish grew considerably for both frozen crayfish products (23.9%) and fresh crayfish (30.2%). Fresh crayfish had the highest weighted average import unit value (11.23 €/kg), followed by frozen crayfish (8.51 €/kg).

Figure 21: Crayfish import unit values, EU weighted average



***Source**: based on elaborations from Eurostat*

Market trends for selected species in the Baltic countries

By analyzing trends of selected aquaculture species, which are separated by codes in trade statistics (carp, catfish, crayfish, eel, sturgeon, tilapia and trout) for Estonia, Latvia and Lithuania, a clear increasing tendency is observed for exports of sturgeon roe as well as fresh products of trout, tilapia and catfish to the EU countries. In contrast, exports of frozen products to the EU followed a declining trend, in particular for frozen carp and catfish products. In addition to domestic consumption, which has been estimated as minor, the Baltic countries represent significant trading hubs for the selected aquaculture species.

In 2012-2015, **imports of selected aquaculture species** into the Baltic countries from the EU countries increased from 5.850 tonnes to 6.607 tonnes (+13%). Import value grew from € 17 million to € 26 million (+53%) accordingly. The largest growth was attributed to **Estonian** imports which amounted to 4.455 tonnes valued at € 18,4 million in 2015, increasing by 60% in volume and 109% in value over 2012. The largest growth in import value was due to increased Estonian import of **sturgeon roe** from € 246.000 to €1,9 million. In terms of volume, the growth was attributed to increasing imports of frozen **fillets of catfish**, **tilapia** and **trout** into Estonia, as well as fresh whole trout and smoked trout products.

Imports of selected aquaculture species into **Latvia** followed a 4% increase in volume reaching 1.378 tonnes in 2015, growing 41% in value to € 4,9 million. Increased imports of fresh whole trout, fresh trout fillets and smoked trout fillets, as well as sturgeon roe. In contrast, imports of selected species followed a diverse trend in **Lithuania**, decreasing to 775 tonnes (-55%), valued at € 2,7 million (-44%). The decline was caused by lowered imports of fresh trout fillets, frozen whole carp and catfish and frozen catfish fillets.

In the same period, **exports of selected species** from the Baltic countries to the EU increased from 2.636 tonnes to 2.784 tonnes (+6%), while the export value grew from € 10,5 million to € 15 million (+43%). The main part of the growth was due to **Estonia** which increased its exports of the selected species from € 4,9 million to € 9,9 million, and in volume terms, it corresponded to the change from 808 tonnes to 1.185 tonnes. The reason for the increase was higher exports of **sturgeon roe**, **eel** and **fresh whole trout** and **fresh trout fillets**.

Latvian exports of selected aquaculture species into the EU declined slightly in both value and volume. In 2015, they amounted to 563 tonnes valued € 1,9 million, decreasing 16% in volume and 1% in value over 2012. However, growth of Latvian exports into the EU was observed for fresh catfish, tilapia and trout fillets. A decline was mainly for frozen catfish and tilapia fillets.

As in Latvia, **Lithuanian exports** of selected species also fell to 1.035 tonnes in 2015, valued at € 3,2 million. In terms of volume, exports fell 11% and 13% in value over 2012. The main decrease was due to lowered exports of frozen catfish and tilapia fillets and frozen whole trout. In contrast, Lithuanian exports of whole fresh trout and fresh trout fillets were on the rise during this period.

Further development prospects

Many of the selected freshwater aquaculture species show significant potential for trade growth on existing and emerging markets. However, the current challenges facing the sector, such as limited production, fragmented logistics and distribution network, competition from similar freshwater species, the lack of an attractive image, small-scale size of the farming enterprises and their reduced negotiating power versus the retail sector, and insufficient financing of marketing and promotion activities, all hinder expansion of trade in EU markets. Much of the sector's growth to date has been found only among low valued-added or mass-market products. However, the following areas for development of the freshwater species have been identified to increase competitive advantages and to secure economically, environmentally and socially sustainable development of the aquaculture industry.

Responsible aquaculture practices by European producers have to be further encouraged through the best management practices, traceability and food safety assurance to strengthen the **product quality** of farmed freshwater species. **Consistency of supply** and **sufficient production quantity** are essential for securing uninterrupted supply volume of products to supermarkets, while many of the freshwater species that are sold on the EU markets are handled by fishmongers and traditional retail shops. Increased production of some species may be challenging; but, improved logistics and the overall supply chain are ways to improve productivity growth. Optimization of the distribution chain and improved distribution channels can be explored depending on the needs and demand from target markets.

Development of more sophisticated **value-added products** which are different from the mass-market products, according to consumer needs in the target markets, is one of the main opportunities for freshwater fish producing enterprises to extend their market. Increased focus on new product forms and product convenience should be explored by producers, following market trends that can already be observed. Production of ready-to-cook meals, ready-to-eat meals, snacks, "consumer friendly" and boneless freshwater fish products, and other convenient products should be evaluated, creating a niche products for targeted consumer groups.

Along with common growing expectations from consumers for quality and diversity of products, especially locally produced, **certification** and **labelling** of freshwater products are the most important means to highlight quality of aquaculture products and increase value of exported products. Provided an increased interest in the target markets, eco-labelling could be an important option at the production stages for freshwater fish products, strengthening the image of the products and opening additional sales channels on the markets, as for example in Germany, where increasing number of supermarkets and smaller shops select their fish assortment exclusively from sustainable and certified sources.

Compared to marine species, freshwater species, and especially freshwater aquaculture species have a more vulnerable position on the markets because they lack a strong and attractive **product image** among consumers. Even though the image and perception of various freshwater species is different, the lack of consumer knowledge and awareness about valuable nutrients of farmed fish and its overall beneficial effects on human health are common for the freshwater aquaculture industry. Capitalisations on high quality products from environmentally controlled production, focus on sustainability and certification of the freshwater farmed fish products and capitalization on proteins of high biological value, vitamins, minerals, polyunsaturated fatty acids and health benefits will support the consumer confidence and enhance the positive image of freshwater aquaculture products. **Marketing** of freshwater aquaculture products as sustainable, healthy, valuable and safe products will contribute to the increased consumer knowledge, consumer awareness and preference of those products.