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# EUMOFA

European Market Observatory for Fisheries and Aquaculture Products

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## 1 Abalone in the EU market

Abalone is one of the most expensive seafood items worldwide. As with other seafood<sup>1</sup>, production has recently shifted from wild caught to farmed and, today, over 95% of abalone comes from aquaculture. China is by far the main market for abalone products, consuming about 90% of its domestic production as well as importing abalone products from other origins (Australia, the USA, etc.). In the EU, France is the main abalone producer in terms of both wild catch and aquaculture.

### 1.1 Biology, resources, and exploitation

#### Biology

Abalone is the common name for any of a group sea snails (gastropod molluscs) of the genus *Haliotis*. There are about 60 species of abalone over the world, which vary widely in size. The *Haliotis* genus has a worldwide distribution, along the coastal waters of almost every continent. The majority of abalone species are found in cold waters, including off the coasts of New Zealand, South Africa, Australia, Western North America, and Japan. Abalone grows slowly and feeds on seaweed.

The shells of abalone have a flat, open spiral structure, and several respiratory pores in a row near their outer edge. The thick inner layer of the shell is composed of nacre (also known as mother-of-pearl), which in many species is highly iridescent, giving rise to a range of strong, changeable colours, which make the shells valuable as decorative objects, jewellery, and suchlike.

The “ormer” abalone (*Haliotis tuberculata*) is found in EU waters. Adult ormers range from 8 to 14 cm, reached after five years, and the minimum landing size for those that are wild-caught is 9 cm. In the EU, the species is mostly found in the Channel, Brittany and Normandy (France) and in the Channel Islands<sup>2</sup>.

#### Resource, exploitation, and management in the EU

Abalone species are harvested all over the world and are most often caught by diving or hand-collecting. In recent years, fisheries in countries catching abalone have shown similar trends, with landings (and illegal fishing) rapidly increasing, and then falling as stocks were overfished. Abalone farming has grown in several countries to compensate for the decrease of wild-caught supply<sup>3</sup>.

*Haliotis tuberculata* is the only European abalone species that is commercially exploited. It is harvested by diving. In France, the fishery is regulated with a limited number of diving licenses and an annual quota. Catching abalone is permitted for recreational fisheries, but diving for abalone is forbidden. Both the commercial and recreational fisheries are subject to the minimum landing size (9 cm) and fishing closure during the spawning season (in summer).

Recreational fishing can be regionally significant (e.g. Tasmania in Australia, Brittany in France, etc.) and IUU fishing remains significant in certain regions where it is abundant despite quota systems being implemented<sup>4</sup>.

Abalone farming began in the late 1950s and early 1960s in Japan and China. Rapid development of abalone cultivation took place in the 1990s, and it is now widespread in many countries including the USA, Mexico, South Africa, Australia, Japan, China, Taiwan, Ireland, Iceland, and others. Worldwide, there are over 15 species of abalone that are farmed, and commercially important. Abalone is farmed using many different culture methods<sup>5</sup>, both on land and in the sea. These include intensive culture (in land-based tanks, nets or in structures), and extensive culture (in artificially arranged substrate or structures where seeds are planted, with or without added food<sup>6</sup>).

### 1.2 Wild-caught abalone fisheries

According to FAO statistics, world catches of *Haliotis* species amounted to 9.107 tonnes in 2017, down 37% from 2008, mostly attributable to reduced abundance of the main caught species (due to high fishing pressure and high illegal catches in some countries), often leading to the implementation of management measures. Overall, legal catches of abalone species have gradually decreased from the 20.000 tonnes yearly catches recorded in the 1970s. Explanations for the decline include overexploitation, illegal harvesting, disease, and habitat degradation<sup>7</sup>.

In 2017, the leading producers were Australia (33% of the world production volume) and Chile (30%), and to a lesser extent Japan (11%) and New Zealand (9%). Inside the EU, France is the only producer, with 35 tonnes caught in 2017, consisting exclusively of ormer (*Haliotis tuberculata*).

During 2008–2017, all major producing countries have experienced decreasing abalone catches: -35% in Australia, -15% in Chile, -41% in Japan, -14% in New Zealand. Only South Africa experienced a significant increase (+46%). In France, catches have fluctuated, reaching a peak in 2011 at 49 tonnes, then averaging between 35 and 38 tonnes.

<sup>1</sup> European seabass, gilthead seabream, turbot, etc.

<sup>2</sup> <https://doris.ffesmm.fr/Especies/Haliotis-tuberculata-tuberculata-Ormeau-437>

<sup>3</sup> <http://www.fishtech.com/ThailandSymposium1.pdf>

<sup>4</sup> <http://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/902588/>

<sup>5</sup> <http://www.fishtech.com/abaloneinfo.html>

<sup>6</sup> <http://www.fishtech.com/ThailandSymposium1.pdf>

<sup>7</sup> See footnote 6.

Table 1. **WORLD CATCHES OF ABALONE *HALIOTIS* SPP. (volume in tonnes)**

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	4.713	4.961	4.083	4.276	4.014	3.829	3.596	3.363	3.095	3.041
Chile	3.210	3.641	3.009	2.255	2.252	2.067	2.250	2.395	2.361	2.717
Japan	1.687	1.855	1.461	1.259	1.266	1.395	1.363	1.302	1.136	1.000
New Zealand	932	979	1.115	967	891	822	849	923	932	802
Mexico	715	743	756	424	452	411	418	601	476	667
Peru	2.757	274	2.237	1.195	1.312	739	1.342	480	573	409
Philippines	247	202	354	362	358	320	325	324	269	234
Korea	172	226	235	165	173	124	185	149	96	112
South Africa	61	-	128	153	141	156	109	142	86	89
France	27	29	42	49	36	37	38	35	36	36
Other	2	1	1	149	54	-	50	-	55	-
<b>Total</b>	<b>14.523</b>	<b>12.911</b>	<b>13.421</b>	<b>11.254</b>	<b>10.949</b>	<b>9.900</b>	<b>10.525</b>	<b>9.714</b>	<b>9.115</b>	<b>9.107</b>

Source: FAO Fishstat.

### 1.3 Aquaculture

According to FAO statistics, world production of farmed abalone species (*Haliotis* spp.) amounted to 168.347 tonnes in 2017, up 312% from 2008, thanks to the strong growth of Chinese production.

The leading producers were China (88% of the world production volume) and Korea (10%). To a lesser extent, other important producing countries were South Africa, Chile and Australia (each accounting for 1% of world production volume). Inside the EU, France is the main producer with 7 tonnes produced in 2017, consisting exclusively in the species *Haliotis tuberculata*. Some small-scale production also takes place in Spain and Ireland (both below 1 tonne in 2017). In Ireland, other Asian abalone species are also farmed.

Due to the recent development of abalone farming industry, during 2008–2017, all major producing countries experienced strong increasing trends in farmed abalone production: +350% in China, +211% in Korea, +8% in South Africa and 97% in Chile. The EU also experienced a strong increase in production (+96%), primarily in France.

Table 2. **WORLD AQUACULTURE PRODUCTION OF ABALONE, *HALIOTIS* SPP. (volume in tonnes)**

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
China	33.010	41.884	54.842	73.192	86.909	105.646	110.288	122.573	134.741	148.539
Korea	5.146	6.207	6.228	6.779	6.564	7.479	8.977	10.090	12.343	16.027
South Africa	1.037	914	1.015	1.036	1.111	1.470	1.307	1.479	1.400	1.122
Chile	514	841	794	835	828	1.111	1.130	965	1.274	1.015
Australia	504	681	455	491	605	724	825	850	757	873
USA	175	200	250	250	250	201	341	341	341	341
Taiwan	348	218	171	87	79	147	213	345	298	276
New Zealand	8	8	80	114	101	77	87	81	90	90
Mexico	30	47	23	40	64	60	22	19	12	24
Chile	1	2	-	6	25	23	16	12	2	16
EU	4	0	5	6	6	8	6	6	7	8
Other	46	14	10	21	20	20	5	4	11	4
<b>Total</b>	<b>40.826</b>	<b>51.016</b>	<b>63.879</b>	<b>82.862</b>	<b>96.567</b>	<b>116.973</b>	<b>123.224</b>	<b>136.771</b>	<b>151.285</b>	<b>168.343</b>

Source: FAO Fishstat.

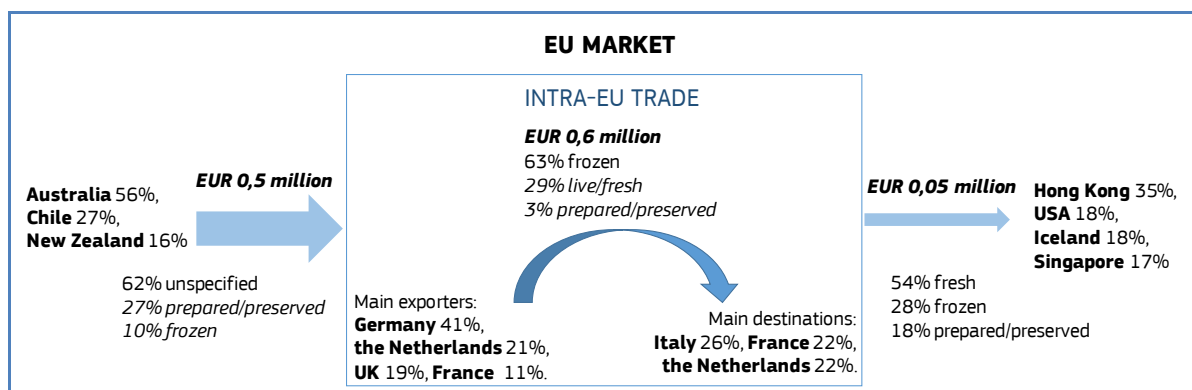
In France, the company “France Haliotis” has been developing since 2004 as an abalone hatchery and farm in Northwest Brittany. Seeds and juveniles are cultured on land (fed with harvested algae), grown in offshore cages (where they feed on natural seaweed), and then marketed after three to five years. The company also sells seeds and juveniles to other farms in France, Spain and Ireland,

and target oyster farmers for potential diversification of their activities. Abalone is very fragile, sensitive to both handling and temperature variations, so high mortality can occur at any stage of the aquaculture process. Therefore, farming is labour intensive (almost 1 FTE<sup>8</sup> for 1 tonne of product) making the sector still fragile in terms of profitability<sup>9</sup>.

## 1.4 Import – Export

Abalone is traded live/fresh, frozen and prepared/preserved<sup>10</sup>. In 2018, the EU had a trade deficit of EUR 490.050 for abalone products. The deficit is mainly attributable to imports from Australia (56% of total extra-EU import value), Chile (27%), and New Zealand (16%). Most of imports are destined for the UK, which accounts for 64% of the total 16 tonnes of abalone products imported from non-EU countries in 2018. Within the EU<sup>11</sup>, frozen products accounted for 63% of the total value of abalone trade between Member States. Germany, the Netherlands, the UK and France are the main suppliers (41%, 21%, 19% and 11% of abalone intra-EU exports by value, respectively). The main destinations were Italy, the Netherlands and France (26%, 22%, and 22% of intra-EU exports by value, respectively). Extra-EU exports are very limited (2,4 tonnes in 2018, of which 63% were live/fresh products). The main destinations were Hong Kong, the USA, Iceland and Singapore.

Figure 1. THE EU TRADE MARKET FOR ABALONE IN 2018



Sources: EUMOFA, based on Eurostat (online data code: DS-016890).

## 1.5 Market insights

The meat of abalone is considered a delicacy in certain parts of Latin America (particularly Chile) as well as France, New Zealand, East Asia, and Southeast Asia. It is mostly marketed live/fresh and whole but can also be traded frozen without the shell and even canned (e.g. in Mexico)<sup>12</sup>. China is by far the main market for abalone products, which consumes 90% of its domestic production<sup>13</sup> as well as importing from other origins (Australia, the USA, etc.).

France is the main EU country producing wild-caught abalone. In 2018, about 45% of catches were sold in auctions (15 tonnes). The main auctions involved were in the Channel seaboard: Brest, Saint-Quay-Portrieux, Roscoff and Erquy. While first-sale volumes fluctuated over 2009-2018, their average price in French auctions experienced an increase (+20%) from 22,77 EUR/kg in 2009 to 27,23 EUR/kg in 2018. Some of the abalone sold in French regional markets may come from the Channel Islands (Chausey, Jersey, Guernsey, Alderney).

<sup>8</sup> Full Time Equivalent.

<sup>9</sup> <https://www.abalonebretagne.com/>

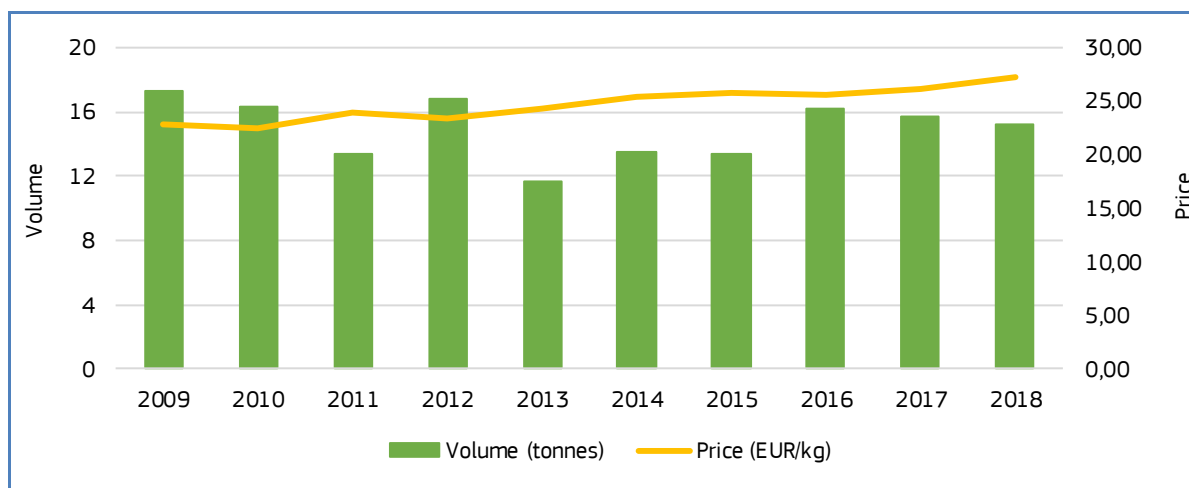
<sup>10</sup> Related CN8 codes: 03078100: Abalone (Haliotis spp.), live, fresh or chilled; 03078300: Abalone (Haliotis spp.), frozen; 03078700: Abalone (Haliotis spp.), other (excl. 0307 81 00, 0307 83 00).

<sup>11</sup> For the analysis of intra-EU trade, only export flows (FOB) have been considered. Comparisons dealing with intra-EU trade statistics (and related results) must be considered with caution, and should take discrepancies into account. Intra-EU trade flows reported by Eurostat cover both arrivals (i.e. imports) and dispatches (i.e. exports). Cost, Insurance and Freight (CIF) and Free on Board (FOB) are international shipping agreements used in the transportation of goods. The CIF rule places an obligation on the seller to arrange insurance for the consignment. If the FOB rule is used, once the goods have been loaded on board, risk transfers to the buyer, who bears all costs thereafter. Because of the differences in valuation principle (CIF > FOB), arrivals should be slightly higher valued than dispatches.

<sup>12</sup> <http://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/902588/>

<sup>13</sup> <http://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/902597/>

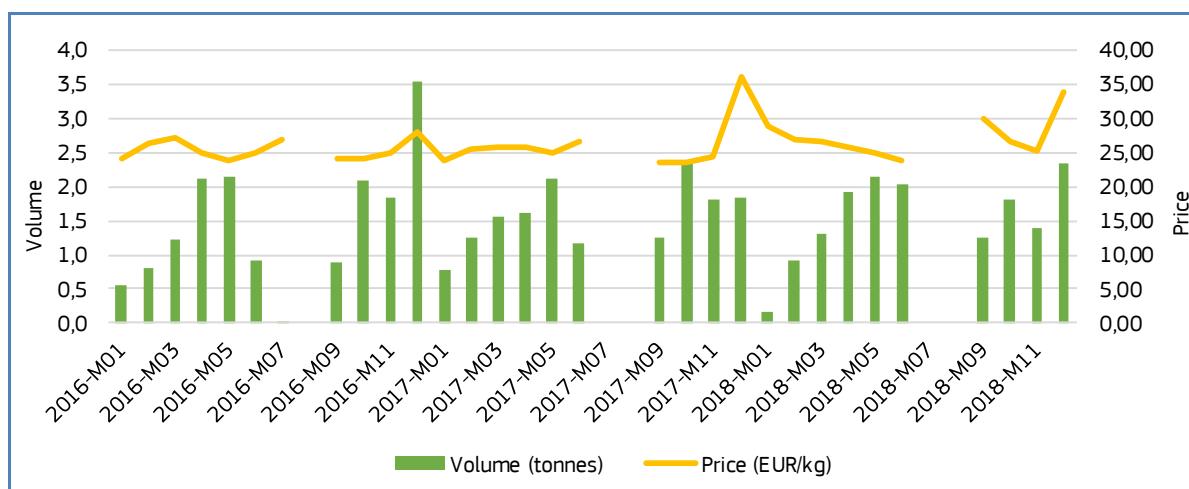
Figure 2. **FIRST-SALES VOLUMES AND PRICES OF ABALONE IN FRENCH AUCTIONS BY YEAR**



Sources: EUMOFA.

First-sale data in France show the seasonality of the abalone fishing activity, with a closure in summer and price peak in December for the Christmas season.

Figure 3. **FIRST-SALES VOLUMES AND PRICES OF ABALONE IN FRENCH AUCTIONS BY MONTH**



Sources: EUMOFA.

According to French stakeholders, consumer prices of farmed abalone reach 60,00–80,00 EUR/kg, whereas wild-caught abalone is cheaper (40,00–50,00 EUR/kg). The average meat yield<sup>14</sup> is higher for farmed abalone (40%) than for wild caught abalone (35%). The reason is that wild-caught abalones are bigger (above 9 cm) so the shell is harder and heavier. Farmed abalone is sold at smaller sizes (4-7 cm) and aquaculture farms typically target especially high-end restaurants, which look for products with a guaranteed supply anytime of the year.

<sup>14</sup> Meat weight out of total weight.

## 2 Atlantic cod in the EU<sup>15</sup>

### 3.1. Introduction

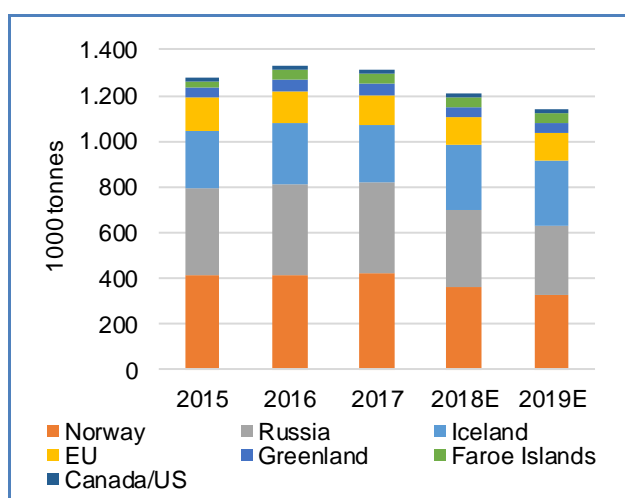
**Atlantic cod** (*Gadus Morhua*) is a benthopelagic fish that inhabits the water just above the sea bottom, feeding on zooplankton, fish and benthos. Atlantic cod can live for up to 25 years and has a common length of 100 cm. Normally its weight ranges between 5 and 12 kg, but the largest weight ever recorded is 96 kg<sup>16</sup>. The species usually attain sexual maturity between two and four years old, they are not all mature before they are six years old. There is also a tendency for cod in the northern North Sea to mature at an older age than in the southern North Sea<sup>17</sup>. Spawning occurs in the winter and beginning of the spring, where big schools of fish are formed.

Atlantic cod's geographical distribution spreads widely in the North-Atlantic Ocean, from the Barents Sea and Bear Islands in the east to the North Sea, Baltic Sea, around Iceland and Greenland to the North American coast. In the North-Atlantic Ocean cod normally appears in depths of up to 600 meters in the open ocean, grounds close to shore and in fjords. It can adapt to a variety of temperatures and lives in almost every salinity from nearly fresh to full oceanic water<sup>18</sup>. Atlantic cod in the North East Atlantic are divided into 14 separate stocks which remain largely separate from one another. Important stocks in European waters are the North Sea, Skagerrak, Western Baltic, Eastern Baltic, Celtic Sea, Irish Sea, and Western Scotland<sup>19</sup>. The North East arctic cod is by far the largest stock of Atlantic cod in the world and the stock is known for doing long migrations from the Barents Sea to the coast of Norway to spawn during the winter.

Atlantic cod is among the most important of all commercial fishes and has been exploited ever since man began to fish in the seas of Europe. Today the major fishing grounds are in the North East Atlantic Ocean within the Barents Sea, Icelandic waters and the North Sea. In the 1950s to early 1990s there were significant commercial fisheries in the northwest Atlantic, but because of heavy overfishing the fish stock in Canadian waters collapsed<sup>20</sup>. In commercial fisheries Atlantic cod are mainly caught with bottom trawls, long lines, seines, gillnets and handlines.

### 3.2. Global catches

Figure 1. **GLOBAL CATCHES OF ATLANTIC COD BY CATCHING NATION**



Source: FAO (2015, 2016, 2017) / Groundfish forum (2018 and 2019 estimates).

Since 2016, the global catch of Atlantic cod has been decreasing each year, from 1.329.000 tonnes in 2016 to an estimated catch of 1.139.000 tonnes in 2019<sup>21</sup>. The declining catch volumes are a consequence of reduced quotas in the most important commercial Atlantic cod fishery which takes place in the Barents Sea.

<sup>15</sup> EUMOFA has conducted a thorough analysis on the price structure in the supply chain of dried salted cod from Norway to Portugal which can be consulted here: <http://www.eumofa.eu/market-analysis#ptat>

<sup>16</sup> <https://www.fishbase.de/summary/gadus-morhua.html>

<sup>17</sup> <http://www.ices.dk/explore-us/projects/EU-RFP/EU%20Repository/ICES%20FishMap/ICES%20FishMap%20species%20factsheet-cod.pdf>

<sup>18</sup> Cohen, D.M., T. Inada, T. Iwamoto and N. Scialabba, 1990. FAO species catalogue. Vol. 10. Gadiform fishes of the world (Order Gadiformes). An annotated and illustrated catalogue of cods, hakes, grenadiers and other gadiform fishes known to date. FAO Fish. Synop. 125(10). Rome: FAO. 442 p

<sup>19</sup> [https://ec.europa.eu/fisheries/marine\\_species/wild\\_species/cod\\_en](https://ec.europa.eu/fisheries/marine_species/wild_species/cod_en)

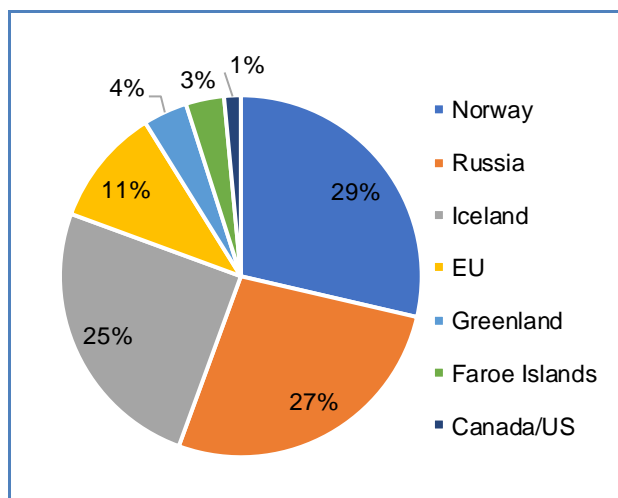
<sup>20</sup> <http://www.ices.dk/explore-us/projects/EU-RFP/EU%20Repository/ICES%20FishMap/ICES%20FishMap%20species%20factsheet-cod.pdf>

<sup>21</sup> FAO (2015, 2016, 2017) / Groundfish Forum (2018 and 2019 estimates).



The largest catching nations of Atlantic cod are Norway, Russia and Iceland, accounting for 29%, 27% and 25% of the total, respectively (2019 estimates)<sup>22</sup>. Norway's and Russia's cod fishery takes place in the Barents Sea, targeting the large Northeast arctic cod stock. The Icelandic commercial cod fishery takes place in the Icelandic Exclusive Fishing zone, where they manage and harvest from their own cod stock around the country.

Figure 2. **ESTIMATED GLOBAL CATCH OF ATLANTIC COD BY CATCHING NATION IN 2019**



Source: Groundfish forum.

### 2.3 EU catches of cod

The EU is estimated to cover 11% of global catches in 2019. The EU's commercial fishery of Atlantic cod takes place mostly in European waters in the North Sea, the Baltic Sea and the Barents Sea.

In 2016, cod landed in the EU reached 92.000 tonnes worth EUR 226 million, ranking 9<sup>th</sup> in value terms among all species and representing 3% of the total value of EU landings<sup>23</sup>. This was mostly driven by landings from the largest quota holders Denmark, the UK and Spain, as well as by landings in Poland and France. In total, volumes decreased by 12% and value decreased by 8% compared to 2015.

Of the top three EU players in the cod fishery, Denmark, the UK and Spain, only the UK experienced an increasing trend from 2015 to 2016, by 17% in volume and 11% in value<sup>24</sup>.

Table 1. **LANDINGS OF ATLANTIC COD IN THE EU BY MEMBER STATE (volume in 1000 tonnes, value in EUR million)**

EU Member State	2012		2013		2014		2015		2016		2017	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Denmark	24	54	18	45	21	51	23	56	20	56	n/a	n/a
UK	11	32	12	31	13	35	14	44	17	49	18	57
Spain	16	35	18	44	19	56	20	60	15	44	15	40
France	10	28	11	31	7	19	6	21	8	27	8	35
Poland	19	27	14	19	14	18	17	18	13	16	11	14
Germany	7	20	7	14	10	21	8	22	5	15	1	4
Sweden	9	15	6	10	6	9	6	8	5	8	4	7
Other	10	12	12	7	9	7	11	14	8	10	7	8
<b>Total</b>	<b>106</b>	<b>222</b>	<b>98</b>	<b>202</b>	<b>97</b>	<b>215</b>	<b>104</b>	<b>244</b>	<b>92</b>	<b>226</b>	<b>65</b>	<b>166</b>

Source: Eurostat

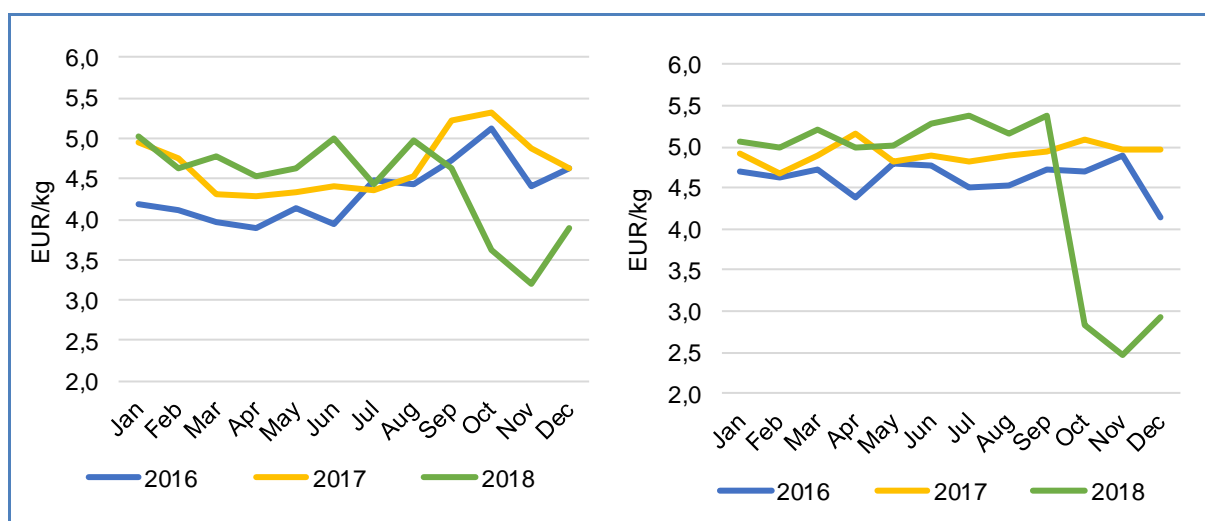
In Denmark, the first-sales price of Atlantic cod decreased throughout the last months of 2018; but the average price for the year was 4,71 EUR/kg, a 2% increase from the year before. The same trend was noticed in the UK where landing price decreased by the end of the year and averaged at 5,08 EUR/kg, a 3% increase from the year before.

<sup>22</sup> Groundfish Forum.

<sup>23</sup> EUMOFA - The EU fish market – 2018 Edition.

<sup>24</sup> Eurostat figures for 2017 are incomplete as Danish data are not available.

Figure 3. **FIRST-SALES PRICES OF COD IN DENMARK (LEFT) AND THE UK (RIGHT)**



Source: EUMOFA.

## 2.4 Extra-EU imports

Most of the fisheries and aquaculture products imported in the EU originate in Norway. Denmark and Sweden are the main entry points for Norwegian products into the internal market.

In 2017, EU imports of cod were 513.000 tonnes valued at EUR 2,4 billion. Norway was the main supplier, providing 182.404 tonnes valued at EUR 864 million. This represented 36% of cod imported by third countries in both volume and value terms. A 5% price increase from 4,48 to 4,71 EUR/kg caused a total value growth of EUR 80 million, 3% more than 2016, for all countries.

Russia and Iceland are also relevant suppliers of cod, responsible for 22% (111.000 tonnes) and 18% (93.000 tonnes), respectively, of total extra-EU imports of the species in volume terms.

During January–November 2018, total import volumes from all suppliers reached 458.000 tonnes valued at EUR 2,3 billion.

Most of the cod imported to the EU consist of frozen products. In 2017, imports of frozen cod reached EUR 1,3 billion and 325.000 tonnes, a 4% increase in value and a 2% decrease in volume from 2016. Imports of fresh products increased by 7% in terms of both volume and value while there were 2% decrease in value and a 9% decrease in volume for the salted products. Dried products decreased by 3% in value and 8% in volume from 2016. During January–November 2018, import value of salted and dried products exceeded total value in 2017, mainly due to a 7% increase of their price.

In general, there was a 5% increase in import prices of all cod products in 2017. This trend has continued throughout 2018 for all categories except for fresh products, whose price showed a 1% decrease in January–November compared to the average price in 2017. The largest price growth was seen for frozen products (+8%).

Table 2. **EU IMPORTS OF COD BY MEMBER STATE (volume in 1000 tonnes, value in EUR million)**

EU Member State	2013		2014		2015		2016		2017		Jan- Nov 2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
<b>Netherlands</b>	112	370	136	464	126	528	130	561	146	652	120	589
<b>UK</b>	87	364	89	396	88	474	91	463	80	435	72	410
<b>Sweden</b>	68	256	77	286	78	370	78	379	78	395	74	400
<b>Denmark</b>	70	243	78	267	79	315	82	327	82	348	77	342
<b>Germany</b>	25	125	31	151	25	152	27	172	23	148	19	134
<b>Portugal</b>	21	57	15	46	18	57	21	66	20	70	27	103
<b>Spain</b>	22	57	28	79	25	91	26	100	24	102	19	88
<b>Other</b>	50	161	56	176	46	188	64	251	60	248	49	224
<b>Total</b>	<b>456</b>	<b>1.632</b>	<b>510</b>	<b>1.864</b>	<b>486</b>	<b>2.175</b>	<b>519</b>	<b>2.318</b>	<b>513</b>	<b>2.398</b>	<b>458</b>	<b>2.290</b>

Source: EUMOFA.

Table 3. **EU IMPORTS OF COD BY PRESERVATION (volume in 1000 tonnes, value in EUR million)**

Preservation	2013		2014		2015		2016		2017		Jan- Nov 2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
<b>Frozen</b>	273	814	317	989	301	1.155	332	1.260	325	1.309	273	1.187
<b>Live/Fresh</b>	78	340	89	378	86	430	89	460	95	490	95	489
<b>Dried</b>	38	215	36	215	35	263	35	272	32	263	30	265
<b>Salted</b>	55	201	55	215	51	251	52	253	47	248	46	257
<b>Unspecified</b>	12	60	12	66	13	75	12	71	14	87	14	92
<b>Prepared/ preserved</b>	0	1	0	1	0	1	0	1	0	0	0	0
<b>Total</b>	<b>456</b>	<b>1.632</b>	<b>510</b>	<b>1.864</b>	<b>486</b>	<b>2.175</b>	<b>519</b>	<b>2.318</b>	<b>513</b>	<b>2.398</b>	<b>458</b>	<b>2.290</b>

Source: EUMOFA.

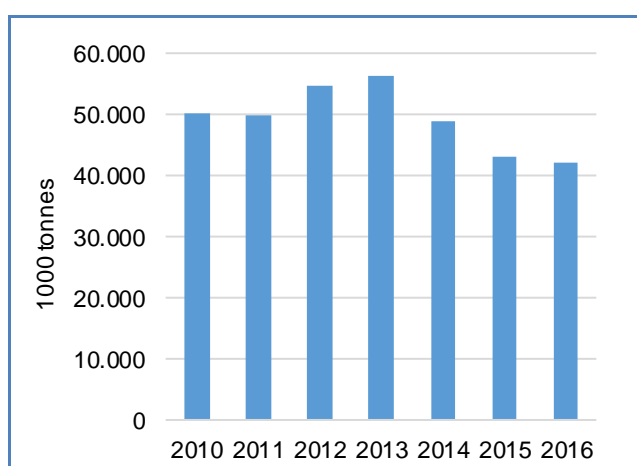
Table 4. **EU IMPORTS OF COD BY MAIN SUPPLIERS (volume in 1000 tonnes, value in EUR million)**

Supplier	2013		2014		2015		2016		2017		Jan - Nov 2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Norway	168	600	195	683	174	790	179	820	182	864	162	825
Iceland	92	452	92	495	91	559	103	621	93	585	95	596
Russia	80	233	96	297	92	347	98	369	111	446	96	415
China	60	198	69	221	64	255	68	274	60	266	50	234
Faroe Islands	14	55	16	63	19	88	19	87	20	98	20	104
Greenland	12	25	17	37	20	45	26	61	25	61	19	47
Other	30	69	25	69	27	91	26	85	20	78	16	70
<b>Total</b>	<b>456</b>	<b>1.632</b>	<b>510</b>	<b>1.864</b>	<b>486</b>	<b>2.175</b>	<b>519</b>	<b>2.318</b>	<b>513</b>	<b>2.398</b>	<b>458</b>	<b>2.290</b>

Source: EUMOFA.

## 2.5 Cod processing in the EU

Figure 4. **PRODUCTION OF DRIED SALTED COD IN PORTUGAL (volume in tonnes)**



Source: Instituto Nacional De Estatística

The EU has a significant fish processing industry with the total number of being 3.603 enterprises in 2015<sup>25</sup>. The industry processes a variety of species into fillets, different preserved products and ready meals. Within the EU, Atlantic cod is the most important for the Portuguese salted-dried cod industry but is also widely used as raw material in other EU Member States<sup>26</sup>. After Norway, Portugal is the world's second largest producer of dried-salted cod, amounting to 42.270 tonnes in 2016. In the period 2013–2016, production has dropped by 25% in relation to reduced global catches of Atlantic cod.

<sup>25</sup> Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic report of the EU fish processing sector 2017 (STECF-17-16). Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-67495-2, doi:10.2760/24311 JRC111988

<sup>26</sup> Scientific, Technical and Economic Committee for Fisheries (STECF) – Economic report of the EU fish processing sector 2017 (STECF-17-16). Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-67495-2, doi:10.2760/24311 JRC111988

## 2.6 Extra-EU export

Exports of cod to non-EU countries are far lower than imports. Volumes exported in 2017 were 27.600 tonnes, slightly increasing compared with 2013, while in value terms a growth of EUR 30 million was recorded, as they reached EUR 150 million in 2017.

Brazil is the largest market of cod exported from the EU. In 2017, exports to this country reached 7.700 tonnes worth EUR 58 million, mainly coming from Portugal and consisting of frozen product (65% of total volume) and dried products (almost 30% of the total). Norway and China are also important export markets of cod for the EU. In 2017, they respectively imported 4.100 tonnes worth EUR 21 million and 7.200 tonnes worth EUR 17 million. The value of cod exports to both countries has increased significantly in the period 2013–2017. Exports to Norway mainly consist of frozen cod landed by EU vessels in Norway and prepared/preserved cod products supplied from the processing industry in Latvia and Lithuania. Exports to China mainly include frozen cod headed and gutted exported by Denmark and the Netherlands but originally entering the EU market from Norway and Russia.

Table 5. **EU EXPORTS OF COD BY MEMBER STATE (volume in 1000 tonnes, value in EUR million)**

EU Member State	2013		2014		2015		2016		2017		Jan- Nov 2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Portugal	14	79	15	84	10	72	10	67	11	79	10	71
Denmark	2	6	2	5	3	9	6	17	7	23	5	23
Latvia	0	0	0	0	0	0	0	2	1	11	1	14
UK	2	5	1	4	1	6	1	6	2	7	1	6
Germany	4	11	2	8	2	8	2	9	1	7	2	7
Spain	4	10	4	12	3	9	2	8	1	6	1	6
France	0	2	0	2	0	3	0	4	1	6	1	7
Lithuania	0	0	0	1	0	1	1	1	2	4	2	5
Other	2	8	2	8	2	11	3	14	2	9	4	15
<b>Total</b>	<b>27</b>	<b>122</b>	<b>27</b>	<b>124</b>	<b>22</b>	<b>119</b>	<b>27</b>	<b>129</b>	<b>28</b>	<b>150</b>	<b>27</b>	<b>154</b>

Source: EUMOFA.

Table 6. **EU EXPORTS TO MAIN MARKETS OUTSIDE THE EU (volume in 1000 tonnes, value in EUR million)**

Country	2013		2014		2015		2016		2017		Jan- Nov 2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Brazil	10	59	11	62	7	50	7	47	8	58	6	51
Norway	4	11	2	7	2	8	3	12	4	21	4	23
China	4	8	4	8	3	9	7	18	7	17	7	16
Switzerland	1	9	1	8	1	11	2	13	2	17	2	20
USA	1	6	1	5	1	7	1	7	2	11	2	12
Angola	3	14	3	16	2	13	1	9	1	8	1	8
Canada	0	1	0	1	0	2	0	2	1	3	1	5
Nigeria	1	2	1	2	1	2	1	1	1	2	0	1
Other	3	13	4	15	4	18	5	18	3	13	4	18
<b>Total</b>	<b>27</b>	<b>122</b>	<b>27</b>	<b>124</b>	<b>22</b>	<b>119</b>	<b>27</b>	<b>129</b>	<b>28</b>	<b>150</b>	<b>27</b>	<b>154</b>

Source: EUMOFA.

## 2.7 Intra-EU export

The three largest intra-EU exporters are the Netherlands, Denmark, and Sweden. They accounted for 68% of the volume and 67% of the value in terms of cod trade in the EU in 2017. Intra-EU exchange of cod experienced a 4% growth in value and 5% decrease in volume in 2017. All top three players contributed to the upward value trend in 2017 while only Sweden showed an increase in volume.

Table 7. **INTRA-EU EXPORTS OF COD BY MEMBER STATE (volume in 1000 tonnes, value in EUR million)**

EU Member State	2013		2014		2015		2016		2017		Jan- Nov 2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Netherlands	65	236	97	349	116	506	148	561	126	609	177	585
Denmark	81	358	85	382	88	420	88	452	84	458	72	408
Sweden	59	225	66	242	69	324	72	343	75	361	64	348
Germany	46	198	49	226	46	242	46	262	38	224	34	211
Poland	18	82	17	76	18	93	19	105	23	132	19	113
Spain	21	70	19	77	20	93	20	95	20	96	20	94
Lithuania	8	31	9	39	9	47	13	68	14	72	12	64
UK	15	60	14	59	14	64	15	63	14	63	12	56
Other	23	102	21	102	21	111	21	115	24	130	22	126
<b>Total</b>	<b>334</b>	<b>1.362</b>	<b>377</b>	<b>1.553</b>	<b>403</b>	<b>1.901</b>	<b>442</b>	<b>2.066</b>	<b>419</b>	<b>2.144</b>	<b>432</b>	<b>2.004</b>

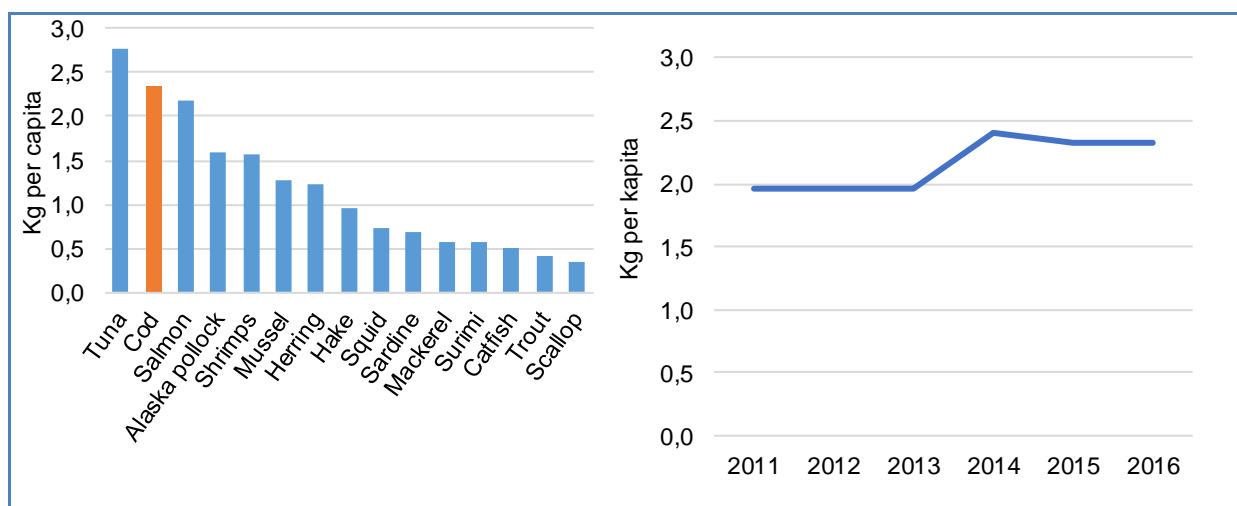
Source: EUMOFA.

## 2.8 Consumption

Cod is one of the most consumed fish species in the EU. With a per capita apparent consumption<sup>27</sup> of 2,33 kg, in 2016 it ranked second after tuna. Compared with 2011, when its consumption amounted to 1,92 kg, 2016 consumption was up by 21%. This was mainly caused by an increased extra-EU imports driven by increased foreign catches by Norway, Iceland and Russia over the period<sup>28</sup>.

In the EU, Atlantic cod is consumed in a variety of different preparations, either as fresh, de-frozen, salted or dried. Atlantic cod is especially known for being considered as an iconic ingredient in Portuguese cuisine, as salted and dried cod, and there is said to be over 1000 cod recipes in Portugal alone<sup>29</sup>.

Figure 5. **PER CAPITA APPARENT CONSUMPTION OF MAIN COMMERCIAL SPECIES IN THE EU IN 2016 (volume in kg) (LEFT) AND PER CAPITA APPARENT CONSUMPTION OF COD IN THE EU (volume in kg) (RIGHT)**



Source: EUMOFA.

<sup>27</sup> Data on apparent consumption come from the supply balance developed by EUMOFA: <http://www.eumofa.eu/supply-balance>

<sup>28</sup> FAO, Eurostat, ICES and Kontali Monthly Cod Report (December 2017)

<sup>29</sup> <http://www.centerofportugal.com/codfishroute/>

### 3 The caviar market<sup>30</sup>

#### 3.1 Catches

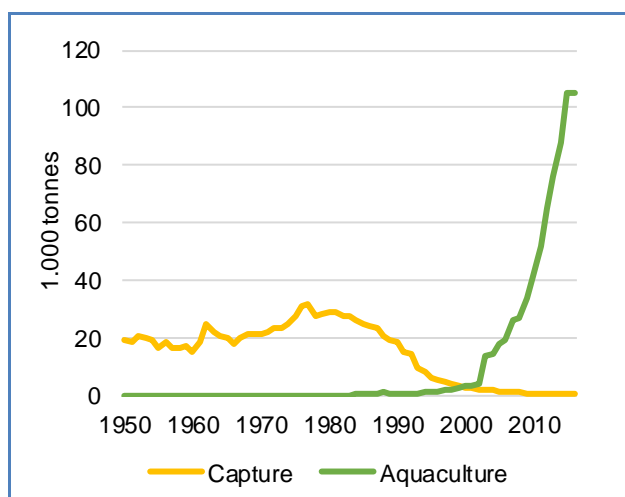
Caviar is roe from sturgeons. Historically, sturgeons were harvested in the Caspian Sea and their roe sold as caviar, mainly by Russia and Iran. The most well-known and high prized caviars are Beluga from the Beluga sturgeon (*Huso huso*), Osetra from the Russian sturgeon (*Acipenser gueldenstaedtii*), and Sevruga from the Starry sturgeon (*Acipenser stellatus*). All species originate in Eurasia, primarily in the Caspian Sea, Black Sea and the connected rivers.

While these three species are the most well-known, most of the caviar on the market today is from several other sturgeon species. According to trade data from CITES<sup>31</sup>, 75-80% of the caviar export is from other species, from the more common varieties as the White sturgeon (*Acipenser transmontanus*), or the Shortnose sturgeon (*Acipenser brevirostrum*) to the higher prized Siberian sturgeon (*Acipenser baerii*) and the Beluga-like Kaluga sturgeon (*Huso dauricus*).

Caviars differ in size and price and are generally graded as classic, royal or imperial describing the appearance of each pearl in terms of size and colour.

#### 3.2 Global production

Figure 1. **CAPTURE AND AQUACULTURE OF STURGEONS IN THE PERIOD 1950–2016 (volume in tonnes)**



Source: FAO.

Overfishing of sturgeon has almost led to the extinction of several species. Historically, the largest capture was recorded in 1977 with 31.800 tonnes. Since 1998, international trade of all sturgeon species and related products has been regulated under CITES, and in 2006, Romania as the first of several countries, introduced a ban on sturgeon fishing in the Black Sea. In 2016 a total global capture of 250 tonnes was recorded.

The first FAO-recorded harvest from aquaculture was in 1984 with 150 tonnes. Since then, it gradually increased to the beginning of the 2000's when it started increasing rapidly year by year due to increased production in China. In both 2015 and 2016, the world aquaculture production of sturgeon was about 105.000 tonnes. Subsequently, nearly all caviars on the market today are harvested from farmed sturgeon.

World production of caviar was recorded at 290 tonnes in 2014<sup>32</sup> and 340 tonnes in 2016<sup>33</sup>. Over the last decade, China has become the main caviar producer in the world. Estimated Chinese caviar production range between 75<sup>34</sup> and 144<sup>35</sup> tonnes.

<sup>30</sup> EUMOFA has published a more comprehensive analysis on the market for caviar in December 2018. The report is available for download under "Studies and reports" and "Ad-hoc analyses" at <http://www.eumofa.eu/market-analysis>.

<sup>31</sup> Convention on International Trade in Endangered Species of Wild Fauna and Flora.

<sup>32</sup> World Sturgeon Conservation Society <http://www.wscs.info/sturgeons/caviar-p-m.aspx>

<sup>33</sup> Harris L., and Shiraishi H. (2018) Understanding the global caviar market. Result of a rapid assessment of trade in sturgeon caviar. TRAFFIC and WWF joint report.

<sup>34</sup> Ibid.

<sup>35</sup> Sicuro B. (2018) The future of caviar production on the light of social changes: a new dawn for caviar?

### 3.3 Production in the EU

According to the Federation of European Aquaculture Producers (FEAP), the EU produced 126 tonnes of caviar from farmed sturgeons in 2016, an increase of 17% from 108 tonnes in 2015<sup>36</sup>. The largest producers were Italy, France, Germany, and Poland, accounting for 80% of the total production in 2016.

Table 1. **CAVIAR PRODUCTION BY MEMBER STATE IN 2015–2016 (volume in tonnes)**

Country	2015	2016
Italy	35	38
France	23	30
Germany	17	15
Poland	10	15
Bulgaria	6	7
Spain	4	6
Finland	4	4
Hungary	2	3
Latvia	2	3
Netherlands	2	2
Belgium/Luxembourg	3	3
<b>Total EU</b>	<b>108</b>	<b>126</b>

Source: FEAP.

Only recently FEAP started publishing information on caviar production. Therefore, production data are only available for 2015 and 2016. On the other hand, historical data on production of sturgeons are available. Italy is by far the largest producer of sturgeons in the EU and has been for the last 10 years. While Italian production has decreased in 2015 and 2016, other countries have increased their production, especially France and Poland with an increase in 2016 of 87% and 190%, respectively. Although the production has fluctuated from year to year, there is an increasing trend with an annual average growth rate of 2,6%.

Table 2. **STURGEON PRODUCTION BY MEMBER STATE IN 2007–2016 (volume in tonnes)**

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Italy	1.200	1.350	1.350	1.900	1.900	1.700	1.900	2.000	1.480	1.000
Germany	228	214	106	120	120	240	150	300	225	225
France	250	250	250	380	280	250	280	298	241	450
Poland	250	270	148	200	240	241	95	140	193	560
Spain	183	370	166	35	40	66	66	100	120	110
Bulgaria	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	120	140
Finland	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	50	60
Netherlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	50	50
Belgium	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	20	20
<b>Total</b>	<b>2.111</b>	<b>2.454</b>	<b>2.020</b>	<b>2.635</b>	<b>2.580</b>	<b>2.497</b>	<b>2.491</b>	<b>2.838</b>	<b>2.579</b>	<b>2.655</b>

Source: FEAP.

### 3.4 Extra-EU import<sup>37</sup>

Table 3. **YEARLY EXTRA-EU IMPORT OF CAVIAR IN 2014–2018 (volume in kg and price in EUR/kg)**

Year	Volume	Price
2014	24.400	403
2015	16.800	333
2016	23.100	314
2017	30.600	261
2018 (Jan–Sep)	16.100	237

Source: Eurostat/EUMOFA.

EU imports of caviar from non-EU countries are recorded at 30.600 kg in 2017. This represents a steep increase from 2015 and 2016 by 82% and 32%, respectively. The increase in import volume from 2014 was 25%. In each of the last 4 years, EU import volumes have peaked in December.

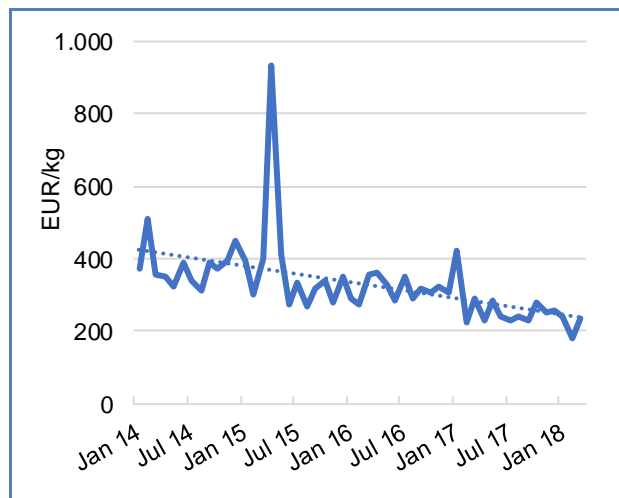
<sup>36</sup> FEAP (2017) European Aquaculture Production Report 2008–2016.

<sup>37</sup> For a methodological description of the usage of trade data, please see chapter 1 in the more comprehensive analyses on the market for caviar published in December 2018. The report is available for download under “Studies and reports” and “Ad-hoc analyses” at [www.eumofa.eu](http://www.eumofa.eu).

The main supplier of caviar to the EU market in 2017 was by far China (27.000 kg), followed by Uruguay (1.900 kg) and Israel (1.100 kg).

The main importing Member States in 2017 were France (13.200 kg) followed by Germany (6.400 kg) and Belgium (4.900 kg). France and Germany are big consumers of caviar, but these import volumes might be somewhat affected by the fact that these Member States are the point of entry for caviar entering the EU market. From 2014 to 2017, the average import price fell from 403 EUR/kg to 261 EUR/kg (-35%).

Figure 2. **MONTHLY EXTRA-EU IMPORT PRICE OF CAVIAR IN 2014–2018**



Source: Eurostat/EUMOFA.

### 3.5 Extra-EU export

Table 4. **YEARLY EXTRA-EU EXPORT OF CAVIAR IN 2014–2018 (volume in kg and price in EUR/kg)**

Year	Volume	Price
2014	29.900	392
2015	30.900	415
2016	32.200	400
2017	37.300	382
2018 (Jan–Sep)	23.500	376

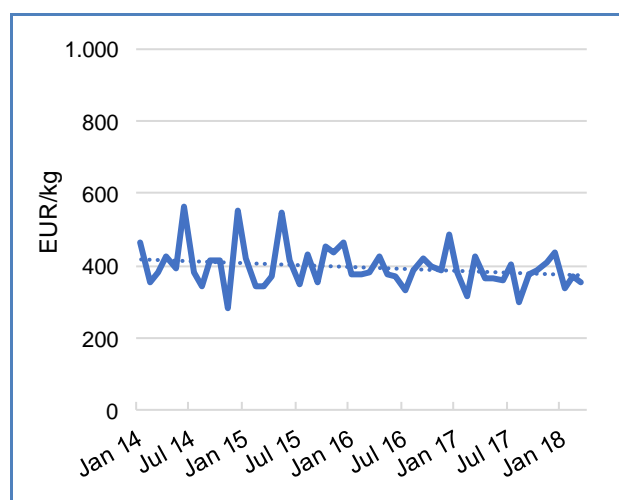
Source: Eurostat/EUMOFA.

The two main EU export markets for caviar in 2017 were the USA (9.600 kg) and Japan (8.800 kg). The same two markets were also the biggest ones in 2016 and 2015. Ranking next in 2017 are the United Arab Emirates (5.500 kg), Hong Kong (2.900 kg), and Switzerland (2.800 kg).

Although volatile, compared to extra-EU import price, the average export price has decreased far less over the last years. From 2014 to 2017, it decreased only by 3% from 392 EUR/kg to 382 EUR/kg.

Along with the increase in production of caviar in the EU, exports to countries outside the EU are increasing. In 2014, exports from the EU are estimated at 29.000 kg and through 2017 volumes have increased by 25% to a total of 37.300 kg.

Figure 3. **MONTHLY EXTRA-EU EXPORT PRICE OF CAVIAR IN 2014–2018**



Source: Eurostat/EUMOFA.



### 3.6 Intra-EU export

Table 5. **YEARLY INTRA-EU EXPORT OF CAVIAR IN 2014–2018 (volume in kg and price in EUR/kg)**

Year	Volume	Price
2014	39.100	395
2015	38.300	376
2016	44.000	355
2017	59.500	343
2018 (Jan–Sep)	48.500	290

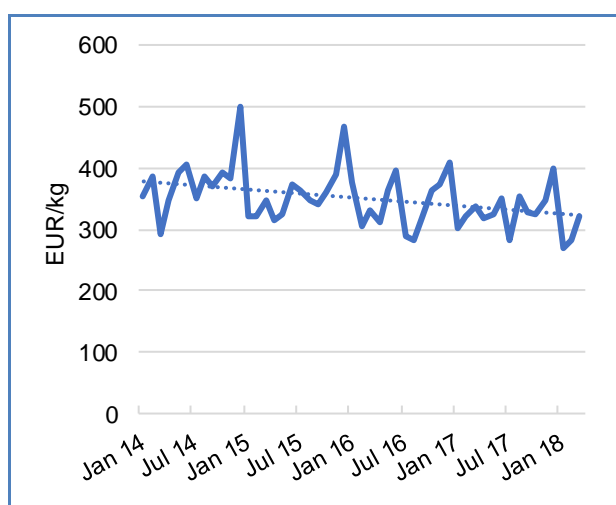
Source: Eurostat/EUMOFA.

The top intra-EU exporting Member State is Italy with almost half of the export volume (30.300 kg). The other half of the volume is exported from Germany (9.100 kg), France (7.800 kg), Poland (6.500 kg), and Belgium (5.800 kg).

From 2014 to 2017, the average intra EU export price fell from 395 EUR/kg to 343 EUR/kg (–13%). The structural changes in prices through the year point in direction of increase in demand in the festive seasons.

Intra-EU trade of caviar, which consists of caviar of EU origin and re-export of imported caviar, is recorded at 59.500 kg in 2017. This represents an increase of 20.400 kg (52%) from 2014. The increase reflects both increase in EU production and in imports to the EU.

Figure 4. **MONTHLY INTRA-EU EXPORT PRICE OF CAVIAR IN 2014–2018**



Source: Eurostat/EUMOFA.

### 3.7 Consumption

Apparent consumption is calculated based on FEAP production data and EUROSTAT trade statistics. According to this methodology, total EU consumption of caviar in 2016 is calculated at 104 tonnes. France is the largest consumer market for caviar (39,2 tonnes), followed by Germany (11,5 tonnes). Of the non-producing countries, the UK is the largest consumer market (3,4 tonnes) followed by Denmark, Luxembourg, and Austria (around 2 tonnes each).

Table 6. **APPARENT CONSUMPTION OF CAVIAR IN THE EU in 2016 BY MEMBER STATE (volume in tonnes)**

	Production	Intra-EU balance	Extra-EU balance	Apparent consumption
<b>Producing countries</b>				
Italy	38	-18,7	-12,3	7,0
France	30	8,1	1,1	39,2
Germany	15	-2,7	-0,8	11,5
Poland	15	-4,2	-4,1	6,7
Bulgaria	7	0,0	0,0	7,0
Spain	6	0,1	0,4	6,5
Belgium	3	-3,6	4,4	3,8
Finland	4	0,8	-1,3	3,5
Hungary	3	0,0	0,0	3,0
Latvia	3	0,4	-0,4	3,0
Netherlands	2	0,0	-0,1	1,9
<b>Non-producing countries</b>				
Austria	n/a	2,2	0,0	2,2
Denmark	n/a	2,3	0,0	2,3
Estonia	n/a	0,4	0,0	0,4
Greece	n/a	0,1	0,0	0,1
Luxembourg	n/a	-0,6	2,8	2,2
Sweden	n/a	0,4	0,0	0,4
United Kingdom	n/a	2,2	1,2	3,4
<b>EU total</b>	<b>126</b>	<b>-12,8</b>	<b>-9,1</b>	<b>104,1</b>

Source: FEAP, Eurostat/EUMOFA.

## 4 First sales of European hake in major places of sale

European hake (*Merluccius merluccius*) is one of the major commercial species in the EU. In 2016, it ranked first among all species landed in the EU in value terms, reaching EUR 500 million. In terms of first sale, Hanstholm in Denmark, St Jean-de-Luz in France and Pasajes in Spain are among the most important first sale places for hake in Europe. There are significant differences between first sales prices between these auctions. In 2018, while gutted hake was sold at around 3,00 EUR/kg in Hanstholm and St Jean-De-Luz, it was sold at 5,00 EUR/Kg in Pasajes. In addition to the place of sale, the main factors affecting hake first-sale prices are supply volume, size, fishing gear used (longline or trawl) and seasonality.

### 4.1 EU hake fisheries and markets

European hake is commonly caught in the Northeast Atlantic, and to a lesser extent in the Mediterranean Sea, in the Black Sea and in the Eastern Central Atlantic. The world production of European hake concentrates in France, Spain, the UK, Italy, Denmark and Ireland. Catches in these countries represent 84% of worldwide catches and 89% of European catches<sup>38</sup>. The EU, especially Spain, constitutes the major market for hake in the world, importing around 700.000 tonnes annually.

In European waters, European hake is one of the most important demersal fish stocks. Two main fishing gears are used for hake, long-line and trawl (for mixed fisheries<sup>39</sup>). The main source of supply in volume in the EU is the trawl hake, but longline hake is more traditional.

There are two stocks of hake in the EU waters: the northern stock, which is found in the North Sea, Denmark's Skagerrak and off the Atlantic coasts of the UK, Ireland and France. The southern stock is located off the Atlantic coasts of Spain and Portugal. Both stocks have benefitted from management measures and recovery plans<sup>40</sup> including the establishment of Total Allowable Catches (TACs). After a decrease of TACs between 2005 and 2007, fishing opportunities for European hake started to increase again after 2010, benefitting France mainly, which increased significantly its catches.

With 35% of the total EU landings of hake in 2017, Spain ranked first at EU level. In 2018, it was mainly sold in Pasajes where 24% of Spanish first sales occur, followed by Burela (20%) and Cillero (18%). France ranked 4<sup>th</sup> in terms of landings with 12% of the EU hake landings in 2017. In 2018, St Jean-de-Luz was the most important first sales place of hake with 33% of French first sales volume, followed by Lorient (17%) and Les Sables-d'Olonne (12%). As for Denmark, it ranked 6<sup>th</sup> at EU level with 5% of the total EU landings of hake. Hanstholm and Thyboron are by far the most important Danish first-sales places, with 54% and 38%, respectively, of total Danish first-sales volume of hake in 2018. In the context of this case study, the focus is made on three of the main first sale places, namely:

- **Pasajes fish auction in Spain:** Pasajes is the 2<sup>nd</sup> largest auction in Spain in terms of value and the 5<sup>th</sup> in terms of volume, with a turnover of circa EUR 77 million for 19.329 tonnes of fish sold in 2018. It is based in the Bay of Biscay on the northeast coast of Spain.
- **St Jean-de-Luz fish auction in France** is the 7<sup>th</sup> largest auction in terms of value in France and the 10<sup>th</sup> in terms of volume, with a turnover of almost EUR 27 million for about 8.000 tonnes of fish sold in 2018. St Jean-de-Luz is located in the Bay of Biscay in the southwest of France. About 208 vessels<sup>41</sup> land their catches in St Jean-de-Luz.
- **Hanstholm fish auction in Denmark:** based in the northwest of Denmark, Hanstholm is the largest auction in Denmark in terms of value and the 3<sup>rd</sup> auction in terms of volume with a turnover of almost EUR 83 million for over 37.000 tonnes of fish sold in 2018.

### 4.2 First sales of hake in Pasajes, St Jean-de-Luz and Hanstholm

The highest first sales volume of hake is recorded in Pasajes (Spain) with almost 15.000 tonnes in 2017, followed by St Jean-de-Luz with more than 6.000 tonnes and Hanstholm with 3.000 tonnes in the same year.

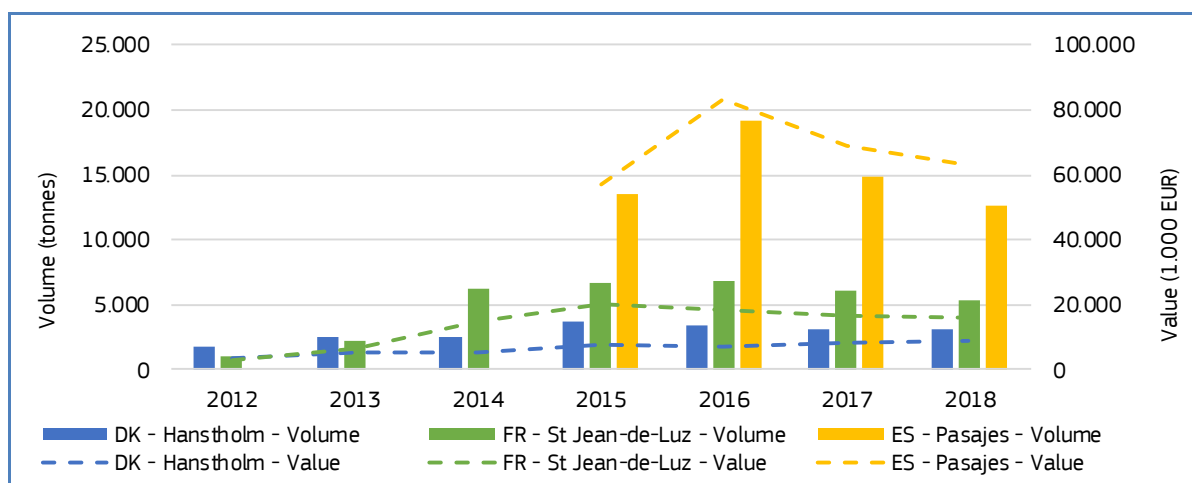
Figure 1. **FIRST SALES OF HAKE IN THE MAJOR PLACE OF SALE PASAJES (ES), ST JEAN-DE-LUZ (FR) AND HANSTHOLM (DK)**

<sup>38</sup> Data from FAO statistics.

<sup>39</sup> Fisheries targeting multiple species.

<sup>40</sup> For the Northern hake stock: Council Regulation (EC) No 2166/2005 of 20 December 2005 establishing measures for the recovery of the Southern hake and Norway lobster stocks in the Cantabrian Sea and Western Iberian peninsula; for the Southern hake stock: Council Regulation (EC) No 811/2004 of 21 April 2004 establishing measures for the recovery of the Northern hake stock.

<sup>41</sup> <http://www.criee64.fr>



Source: EUMOFA.

In St Jean-de-Luz, first sales of hake have experienced a significant increase over the 2012–2018 period, and since 2014 St Jean-de-Luz became the second place of sale of hake among the three auctions after Pasajes with more than double of Hanstholm's first sales of hake in 2014–2017. During the period between 2012 and 2018, first sales of hake in the French auction grew from 1.046 tonnes to 5.264 tonnes (+403%). This trend is also seen at national level in France where landings increased by 22% during the same period, which is related to the increase of TAC since 2010. This increasing trend is also seen in Hanstholm, but to a lesser extent (+79% in volume and +147% in value), even though the increase of landings at national level is more significant than in France (+118% between 2012 and 2016). This resulted in an increase of hake first sales in the second major first-sales place in Denmark (Thyboron), from 600 tonnes to circa 2.000 tonnes between 2012 and 2018.

In 2018, first sales of hake in Pasajes (about 12.700 tonnes) represented more than the double of sales volume in St Jean-de-Luz (circa 5.300 tonnes) and more than four times the sales volume in Hanstholm (3.200 tonnes). During the period between 2015 and 2018, first sales increased to reach a peak in volume and value in 2016, and then decreased in 2017 and 2018, even though landings volumes at national level have increased by +11% during the same period. The analysis of first sale data indicates that hake is landed in various first-sales places and that there is no clear shift of first sales from Pasajes to another auction.

### 4.3 Analysis by presentation state and size

The most common presentation state sold in the three auctions is gutted fish. However, while all first sales of hake are only gutted fish in Hanstholm, other presentation states are sold in smaller volumes in Pasajes and in St Jean-de-Luz. Roes and other presentation states (which are not specified in the auction's statistics) can be found in both auctions, and gutted and headed fish, headed fish, whole fish and tails in Pasajes.

Table 1. **FIRST SALES OF HAKE BY PRESENTATION STATE IN THE MAJOR PLACES OF SALE IN 2018**

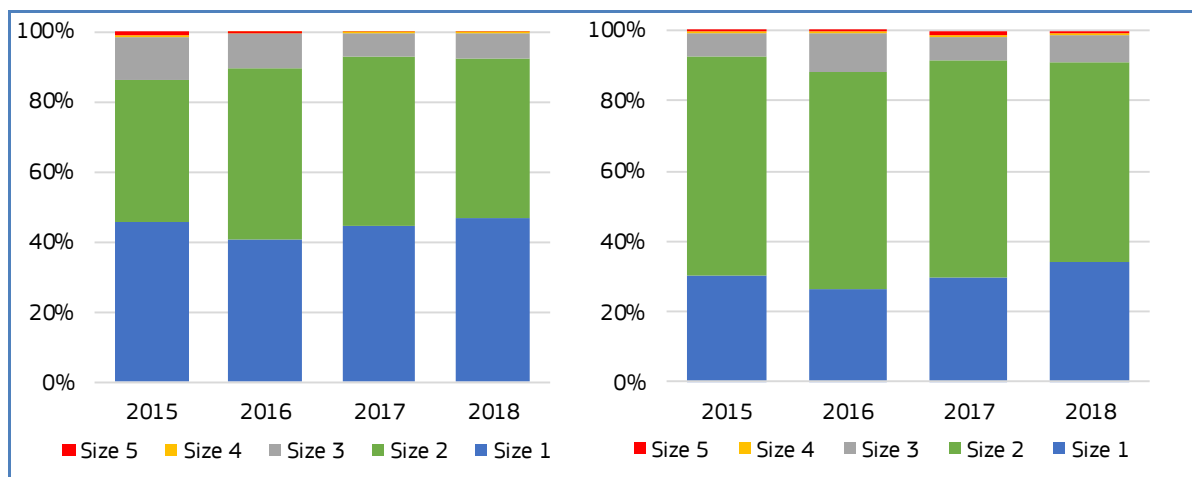
Place of sale	Presentation states	Volume (tonnes)	Value (EUR 1.000)	% Volume	% Value
<b>DK - Hanstholm</b>	Gutted	3.127	8.875	100%	100%
	<b>Total</b>	<b>3.127</b>	<b>8.875</b>	<b>100%</b>	<b>100%</b>
<b>ES - Pasajes</b>	Gutted and headed	61	242	0,50%	0,50%
	Gutted	12.159	60.913	96%	96%
	Headed	2	7	0%	0%
	Roes	183	452	1,50%	0,50%
	Tail	234	1.517	2%	2%
	Whole	7	15	0%	0%
	Other	2	90	0%	0%
	<b>Total</b>	<b>12.649</b>	<b>63.249</b>	<b>100%</b>	<b>100%</b>
<b>FR - St Jean-de-Luz</b>	Gutted	5.262	15.674	100%	100%
	Roes	2	9	0%	0%
	Other	1	19	0%	0%
	<b>Total</b>	<b>5.264</b>	<b>15.702</b>	<b>100%</b>	<b>100%</b>

Source: EUMOFA.

Marketing of hake in Europe is regulated by marketing standards that establish size and freshness grades<sup>42</sup>. Specifically, marketing standards for fresh hake establish the following five size grades used by European auctions recording their sales' statistics:

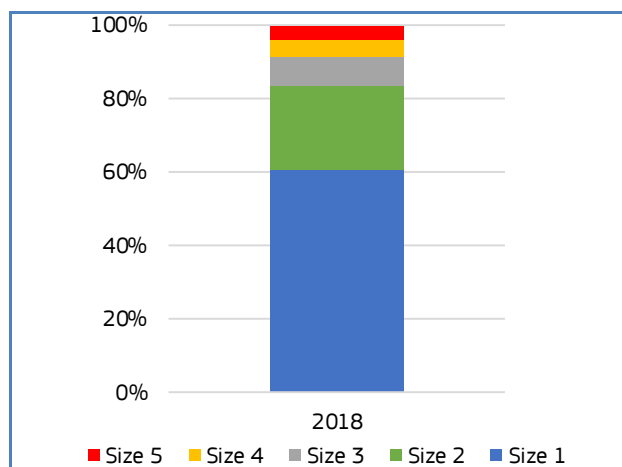
- Size grade 1: 2,50 Kg and over;
- Size grade 2: 1,20 to 2,50 Kg;
- Size grade 3: 0,60 to 1,20 Kg;
- Size grade 4: 0,28 to 0,60 Kg;
- Size grade 5: 0,20 to 0,28 Kg.

Figure 2. **BREAKDOWN OF FIRST SALES OF HAKE BY SIZE IN HANSTHOLM (LEFT), ST JEAN-DE-LUZ (RIGHT)**



Source: EUMOFA.

Figure 3. **BREAKDOWN OF FIRST SALES OF HAKE BY SIZE IN PASAJES\***



\*Breakdown of first sales by size in Pasajes is only available for 2018.  
Source: EUMOFA.

Data indicate that the sales of hake with greater sizes are more significant. In 2018, sales of hake of size grades 1 and 2 represented 47% and 45%, respectively, of sales in Hanstholm, 34% and 57% of sales in St Jean-de-Luz and 60% and 23% in Pasajes. The smallest size grades (sizes 4 and 5) represented less than 1% of hake sales in the French and Danish auctions and less than 10% in the Spanish auction. In addition, over the period between 2015 and 2018, there is a clear increasing trend of sales of the largest hake (i.e. size grades 1 and 2) in Hanstholm. In St Jean-de-Luz, these proportions remained relatively stable during the same period.

A case study analysing price structure in the supply chain of fresh hake in Spain<sup>43</sup> indicated that the Spanish market distinguishes two types of hake according to its size: *pescadilla* (0,50 to 1,50 kg, usually above 1,00 kg) and *merluza* (> 1,50 kg). It also indicates that consumer preferences to either *pescadilla* or *merluza* vary according to regions and traditions, without indicating which product is more important at first sale stage.

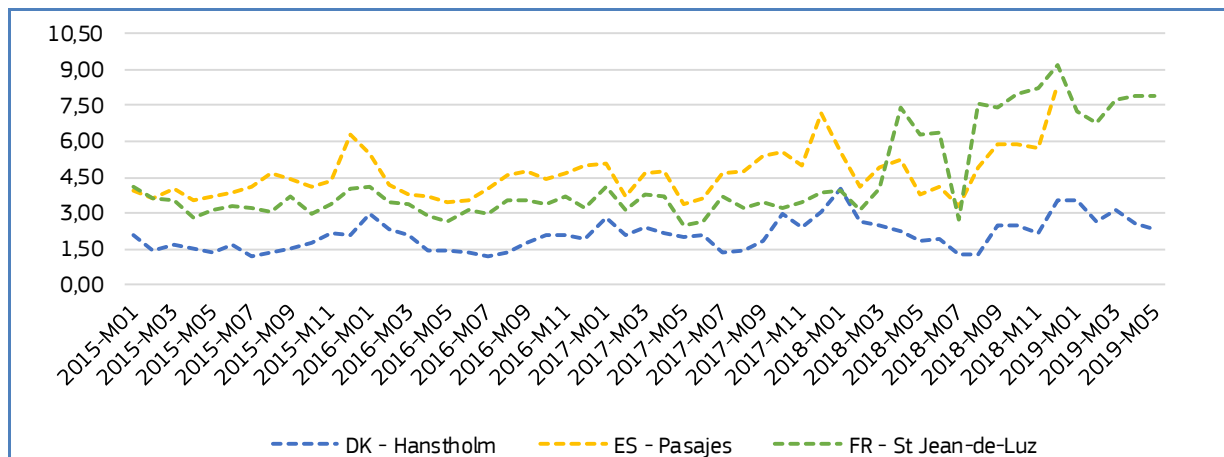
<sup>42</sup> Council Regulation (EC) No 2406/96 of 26 November 1996 laying down common marketing standards for certain fishery products  
<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31996R2406>

<sup>43</sup> [https://www.eumofa.eu/documents/20178/65201/Case+Study+report+Hake\\_EN.pdf](https://www.eumofa.eu/documents/20178/65201/Case+Study+report+Hake_EN.pdf)

#### 4.4 Price trends

There are significant differences of first-sales prices between auctions. Indeed, in 2018, while gutted hake was sold at around 3,00 EUR/Kg in Hanstholm and St Jean-De-Luz, it was sold at 5,00 EUR/Kg in Pasajes. Moreover, while the annual average first-sales price of hake increased significantly in St Jean-de-Luz by 82% between 2015 and 2018, they have known a more moderate growth in Hanstholm (+43%) and in Pasajes (+22%).

Figure 4. MONTHLY FIRST SALES PRICES IN THE THREE SELECTED AUCTIONS



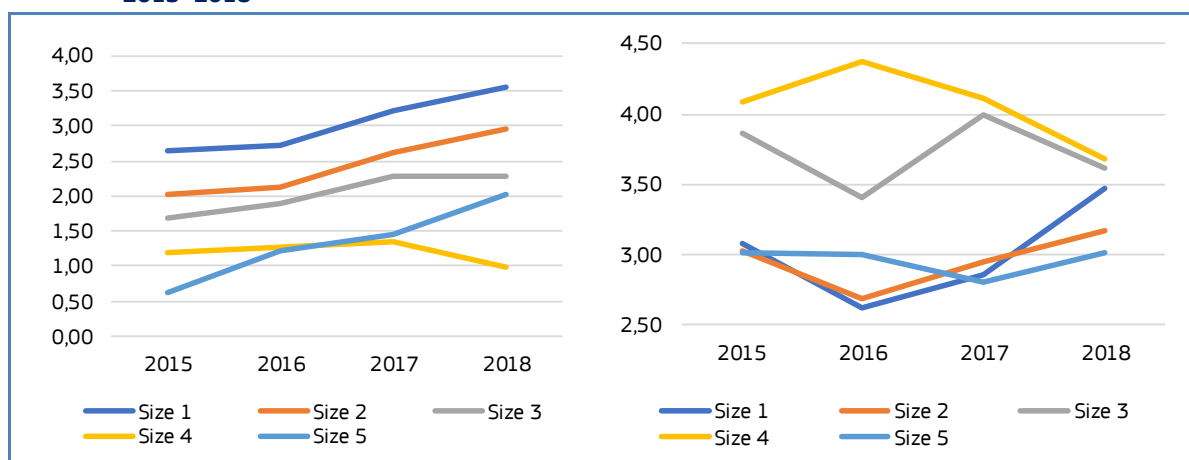
Source: EUMOFA.

Monthly first-sales prices of hake vary significantly between the three auctions. During the period between 2015 and mid-2019, hake was sold on average at about 4,40 EUR/kg in St Jean-de-Luz and Pasajes, but its price was half the price in Hanstholm (2,09 EUR/kg). Prices fluctuated significantly throughout the year and from one year to another. At least two factors affect price:

**First-sales volume:** the analysis of first-sales prices according to landing volumes indicates that first sales prices vary according to first-sales volumes and that the drop of volumes sold usually result in higher prices.

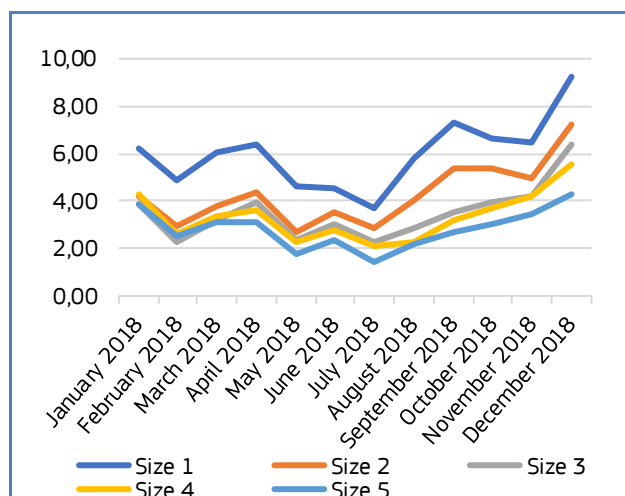
**Fish size:** first-sales prices of fresh hake in the three auctions vary according to size grades. This is particularly significant in Hanstholm, where the smallest hake (size 5) is sold 43% cheaper than the biggest hake (size 1). In St Jean-de-Luz, first-sales prices of the smallest hake (size grades 3, 4 and 5) were higher than first-sales prices of the biggest hake (size grades 1 and 2), which is likely to be related to the fact that the smallest hake is sold to different market, namely the Spanish market (prices of the smallest hake can be sold between 4,00 and 6,00 EUR/Kg in Spain). However, between 2015 and 2018, first-sales prices of the smallest hake decreased, while those of the biggest hake increased. According to the case study “Analysing price structure in the supply chain for fresh hake in Spain,” the main segmentation for fresh hake is based on its size, and *merluza* (> 1,50 Kg) tends to be considered more of a premium product throughout the value chain while *pescadilla* (0,50 to 1,50 kg) is more of a standard product sold at a cheaper price than the premium product.

Figure 5. FIRST-SALES PRICES OF HAKE BY SIZE GRADE IN HANSTHOLM (LEFT) AND ST JEAN-DE-LUZ (RIGHT) IN 2015–2018



Source: EUMOFA.

Figure 6. **FIRST-SALES PRICES OF HAKE BY SIZE GRADE IN PASAJES (2018)**



Source: EUMOFA.

**Presentation state:** There are significant differences between first-sales prices according to the presentation state. For instance, in St Jean-de-Luz, while gutted hake is sold at 2,98 EUR/kg, roes are sold at 4,41 EUR/kg.

Table 2. **FIRST-SALES PRICES BY PRESENTATION STATE IN HANSTHOLM (DK), ST JEAN-DE-LUZ (FR) AND PASAJES (ES) IN 2018**

Place of sale	Presentation states	Price (EUR/kg)	Volume (tonnes)
<b>DK - Hanstholm</b>	Gutted	2,84	3.127
	<b>Total</b>	<b>2,84</b>	<b>3.127</b>
<b>ES - Pasajes</b>	Gutted and headed	3,97	61
	Gutted	5,01	12.159
	Headed	3,86	2
	Roes	2,47	183
	Tail	6,48	234
	Whole	2,19	7
	Other	45,20	2
	<b>Total</b>	<b>5,00</b>	<b>12.649</b>
<b>FR - St Jean-de-Luz</b>	Gutted	2,98	5.262
	Roes	4,41	2
	Other	30,80	1
	<b>Total</b>	<b>2,98</b>	<b>5.264</b>

Source: EUMOFA.

**Fishing gear:** in Spain (not specifically in Pasajes), the case study on price structure in the supply chain of fresh hake shows that long-line hake is considered of a better quality and can be sold at a higher price than trawler hake. Also, longline hake tends to behave more as a premium product (it gets a higher price), while trawler hake behaves as a standard product.

**Seasonality:** monthly prices reach a peak each year, coinciding with the increase of demand occurring during the Christmas season.

## 5 Fishmeal and fish oil

### 5.1 Global production and usage

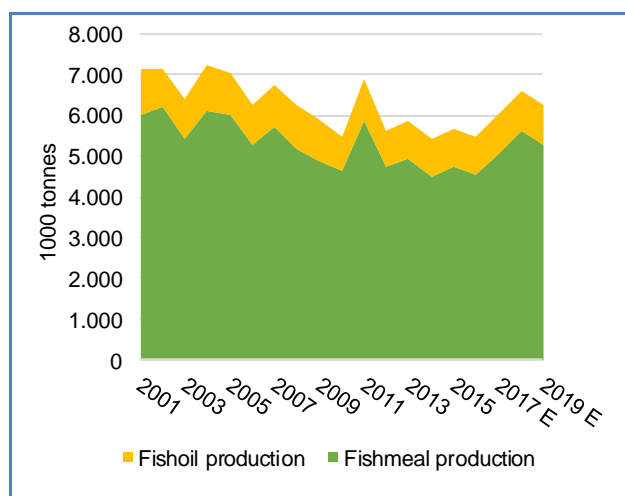
A significant but declining share of world fisheries is destined to the production of fishmeal and fish oil. The average yearly fishmeal and fish oil production in the last 10 years is around 5 million tonnes of fishmeal and 1 million tonnes of fish oil<sup>44</sup>. Each year, around 20 million tonnes of raw material are used to produce fishmeal and fish oil. Around 15 million tonnes come from whole fish of which nearly half is landed in South America. The rest comes from by-products from the processing of wild and farmed fish<sup>45</sup>. It is estimated that by-products account for about 25% to 35% of the total production of fishmeal and fish oil in terms of volume, but there are also regional differences<sup>46</sup>.

Because a large share of these products is used as feed in aquaculture and livestock production, fishmeal and fish oil contribute indirectly to human food production and consumption.

Many species from direct fisheries (the whole fish delivered to the factories) are used in the production of fishmeal and fish oil, in addition to fish trimmings or other by-products from the fish processing industry. The species dominating the raw material supply to the “reduction industry”<sup>47</sup> are mainly small pelagics (like anchovy, sprat and sardinellas). In fact, global fishmeal and fish oil production fluctuates in line with catches of these species and might vary strongly from one year to another. Variations in the fishery of Peruvian anchoveta have the largest impact on the global supply of fishmeal and fish oil. This fishery is the world’s largest in terms of volume, varying between 3 and 7 million tonnes a year. The strong variations in the Peruvian anchoveta fishery is closely linked to the weather phenomena El Nino which occurs every few years and brings warm water into the upwelling areas. In years when this happens, fisheries suffer, and catches might decrease by several million tonnes in one season.

Owing to the growing demand for fishmeal and fish oil from the aquaculture industry, and coupled with high prices, a growing share of fishmeal is being produced from by-products which previously were often wasted. With no extra raw material expected to come from direct fisheries (small pelagics), an increase or even a stable production is foreseen from increased use of by-products. In the EU, most of the trimmings/by-products from the industry are already utilized, thus there are not expected any significant increase in supply coming from the EU producers in the coming years. The largest potential is from the aquaculture industry in other parts of the world, particularly Asian countries<sup>48</sup>.

Figure 1. **GLOBAL FISHMEAL AND FISH OIL PRODUCTION (volume in 1000 tonnes)**



Source: The Marine Ingredients Organisation (IFFO).

In 2018, estimated global production of fishmeal was at 5,6 million tonnes, its highest level since 2011. A good fishing year in Peru, due to large landings of Peruvian anchoveta, was the main reason to the increased supply. Fish oil production was estimated at around one million tonnes in 2018. Due to a quota decrease of small pelagics going into the reduction industry, fishmeal production is expected to decrease in 2019.

<sup>44</sup> IFFO – The Marine Ingredients Organisation.

<sup>45</sup> [https://www.seafish.org/media/Publications/Seafish\\_FishmealandFishOil\\_FactsandFigures2018.pdf](https://www.seafish.org/media/Publications/Seafish_FishmealandFishOil_FactsandFigures2018.pdf)

<sup>46</sup> FAO.

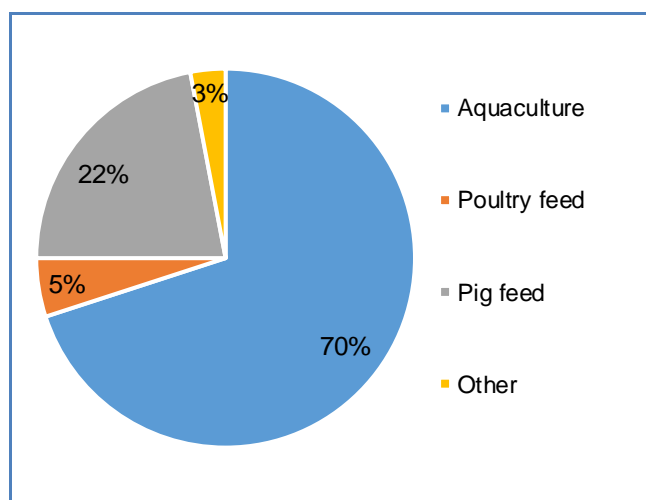
<sup>47</sup> <http://www.bloomassociation.org/en/our-actions/our-themes/sustainable-fishing/reduction-fisheries/>

<sup>48</sup> <http://www.iffonet/byproduct>



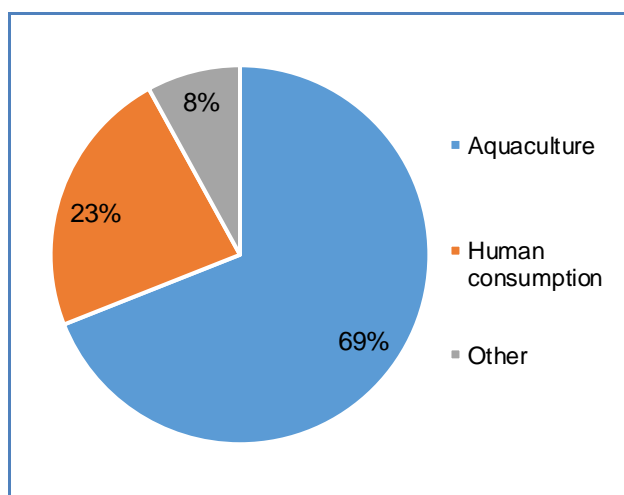
The aquaculture sector is the main consumer of fishmeal and fish oil, taking about 70% of global consumption in 2017. Fishmeal is mainly used in aquaculture feed as well as in poultry and pig diets. In 2017, 22% of fishmeal was used in pig feed and 5% in poultry feed. In 2016, 31% of the fishmeal destined for aquaculture was used to feed crustaceans, 23% to feed salmon and trout and 15% to feed other marine fish<sup>49</sup>.

Figure 2. **GLOBAL FISHMEAL USAGE PER DESTINATION IN 2017 (in volume)**



Source: The Marine Ingredients Organisation (IFFO).

Figure 3. **GLOBAL FISH OIL USAGE PER DESTINATION (volume in tonnes)**



Source: The Marine Ingredients Organisation (IFFO).

Farmed fish, and in particular salmon, needs a certain share of fish oil in their diets to secure a final product which is comparable to their wild counterparts in terms of nutritional qualities<sup>50</sup>. Therefore, of the fish oil destined to the aquaculture segment, around 60% is used in the salmon and trout feed, 18% in marine fish and 6% in crustaceans<sup>51</sup>. The benefits of the omega-3 fatty acids are also highly valued as food supplement for human consumption: this segment is therefore the largest competitor to the aquaculture segment constituting 23% of the global fish oil consumption in 2017. The other category contains hydrogenated products and products for industrial and pharmaceutical purposes<sup>52</sup>.

## 5.2 EU production and usage

In Europe there are 29 factories producing fishmeal and fish oil and their output is around 600.000 tonnes at an export value of more than EUR 1 billion/year. The industry directly generates 3.000 jobs in coastal areas. In addition, the industry generates numerous jobs in the fishing sector and the ancillary support sector<sup>53</sup>.

Each year, the EU produces around 450-500 thousand tonnes of fishmeal and 150-200 thousand tonnes of fish oil. This constitutes around 10-15% of the global annual production. In 2016, EU fishmeal production reached 461.000 tonnes, down by 5% from 2015. In the same period, fish oil production increased by 14% to 144.000 tonnes.

There are currently 10 fish meal in the EU in 6 different EU member states. These factories are owned by 3 companies. Most of the factories are situated in Denmark and the UK.

Denmark is by far the largest producer, accounting for almost 50% of the total. Danish production is mainly based on landings of small pelagics like blue whiting, sandeel, Norway pout and sprat. Spain ranks second, covering almost 20% of the total. In Spain, fishmeal and fish oil are produced from waste/trimmings from the processing industry.

<sup>49</sup> IFFO- The Marine Ingredients Organization.

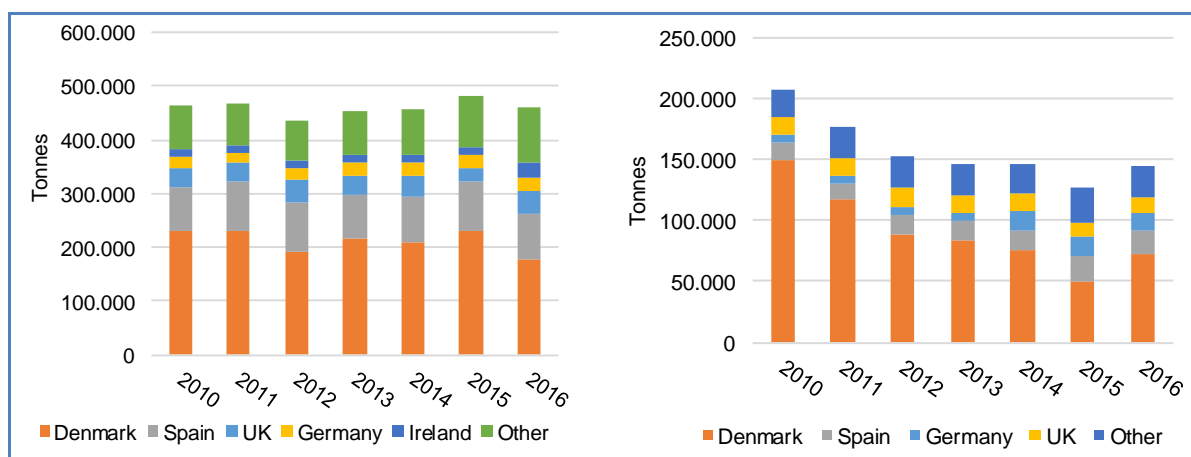
<sup>50</sup> <http://www.fao.org/in-action/globefish/fishery-information/resource-detail/en/c/338773/>

<sup>51</sup> IFFO – The Marine Ingredients Organization.

<sup>52</sup> <http://www.iffonet/node/735>

<sup>53</sup> Eufishmeal: EUfishmeal input to the BREF SA TWG.

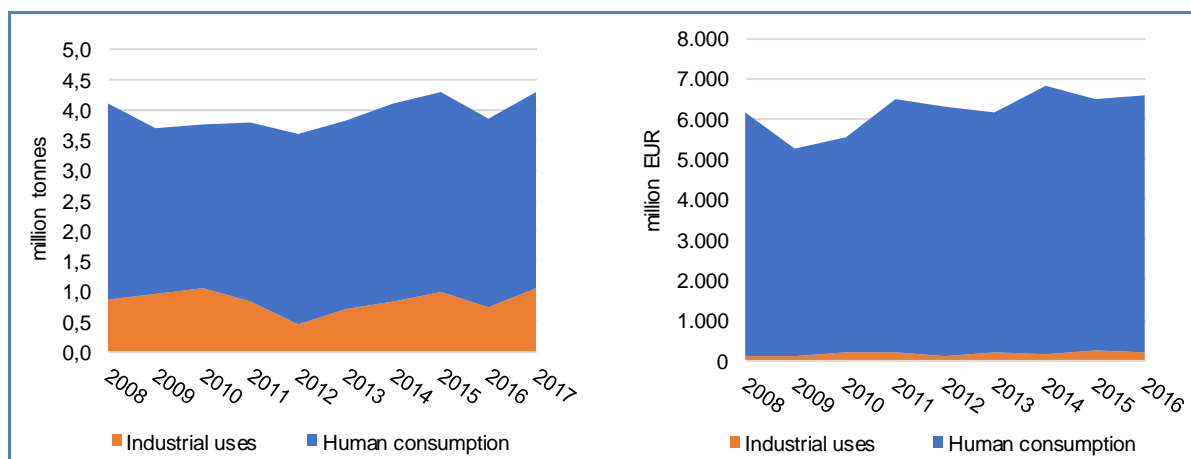
Figure 4. FISHMEAL (LEFT) AND FISH OIL (RIGHT) PRODUCTION IN THE EU



Source: FAO.

EU landings for industrial uses increased by 44% from 2016 to 2017. In 2017, total fishery landings in the EU were 4,3 million tonnes, of which 24% was destined for fishmeal and fish oil production (industrial uses). Of this share, nearly all was landed in Denmark. In terms of value, fish for industrial uses constituted 3% of total EU landings in 2016. Some of the industrial use's volumes will go into the human consumption markets after being produced into fishmeal or fishoil. This is especially true for fishoil which highly valued as dietary supplement in markets with good purchasing power.

Figure 5. TOTAL LANDINGS IN THE EU PER DESTINATION USE (in volume (left) and value (right))

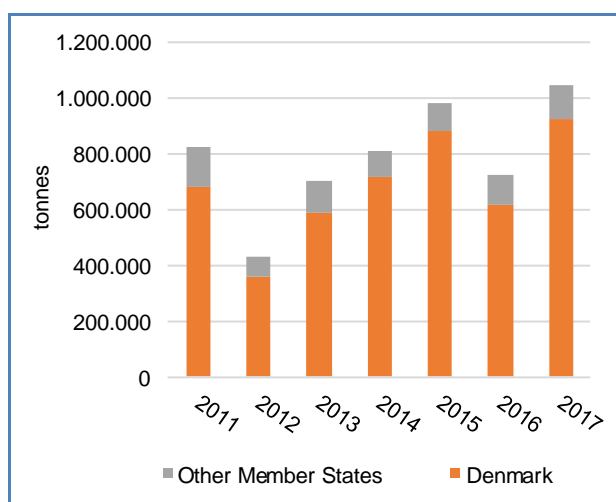


Source: Source: Eurostat, Udenrigsministeriet Fiskeristyrelsen (DK). Eurostat only provide value data including 2016. Volume includes 2017 data for all countries except Denmark. 2017 figures for Denmark are therefore sourced from national statistics in Denmark.

Most of the direct fisheries for industrial uses are landed in Denmark. Other European fishmeal and fishoil producers use mainly trimmings in their production.

The major fish species landed for industrial uses in the EU are sandeel, blue whiting, sprat and herring. Herring is mainly destined for human consumption, but of the large volumes caught and subsequent low prices, some are used in the production of fishmeal and fish oil. Due to significant variations in the quotas for the different species utilized for non-food uses, the availability in the EU fisheries vary strongly from year to year. For example, from 2016 to 2017 there was a large increase in the landings of sandeel (+900%) due to a quota increase of the same proportion. During 2016–2017, total EU landings of all species for industrial uses increased by 44% to 1.040 thousand tonnes.

Figure 6. **EU LANDINGS FOR INDUSTRIAL USES (in volume)**



Source: Eurostat, Udenrigsministeriet Fiskeristyrelsen (DK).

Table 1. **MAIN SPECIES LANDED IN THE EU FOR INDUSTRIAL USES (volume in 1000 tonnes)**

Species	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Sandeel	280	320	350	360	60	250	200	250	40	400
European sprat	320	420	380	290	180	180	250	390	330	260
Blue whiting	70	0	0	0	0	70	170	180	160	190
Herring	130	130	130	110	70	120	120	130	150	150
Norway Pout	30	30	70	0	30	40	30	30	30	20
Boarfish	10	40	100	20	40	30	20	0	0	0
Capelin	0	0	0	40	30	10	10	0	0	0
Other	0	0	0	0	10	10	10	50	10	20
<b>Total EU</b>	<b>840</b>	<b>940</b>	<b>1.030</b>	<b>820</b>	<b>420</b>	<b>710</b>	<b>810</b>	<b>1.030</b>	<b>720</b>	<b>1.040</b>

Source: Eurostat.

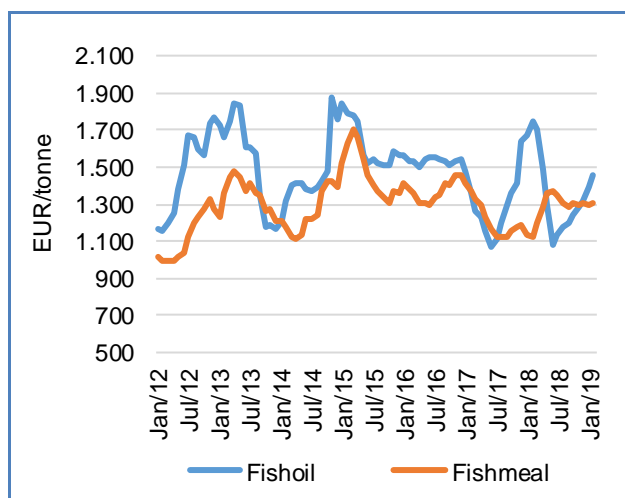
The fishing quotas for small pelagic species forms the basis for the volumes which goes in to the reduction industry. Large quotas of especially sandeel, sprat and blue whiting means more raw material for the fishmeal producers as these species are mainly used for reduction. The large sandeel quota in 2017 (+900% compared with 2016) contributed strongly to the good raw material situation in 2018. In 2018, quotas of the selected species decreased by 11% to 1,94 million tonnes and 2019 quotas show a further 2.4% decline.

Table 2. **EU FISHING QUOTAS OF MAIN SPECIES DESTINED FOR INDUSTRIAL USES (volume in 1000 tonnes)**

Specie	2012	2013	2014	2015	2016	2017	2018	2019	% change 18/19
Sandeel	180	264	207	0	87	486	233	113	-52 %
European sprat	441	457	422	479	458	461	457	463	+1 %
Blue whiting	73	133	218	482	208	385	401	320	-20 %
Norway pout	0	167	106	128	129	142	55	55	0 %
Boarfish	82	82	128	53	43	27	20	22	+10 %
Herring	696	754	783	818	619	684	776	509	-34 %

Source: European Commission (2012-2015), eufishmeal.org (2016-2019).

Figure 7. **FISHMEAL AND FISH OIL PRICES IN THE EU (EUR/tonne)**



Source: Oil world.

With some local variations, the fishmeal and fish oil prices in Europe correspond significantly to the global prices, which are linked to the supply situation in South America, in particular Peru.

During 2018, Peruvian fishmeal and fish oil production increased strongly from the years before and reached its highest level since 2011. Since more than 90% of the Peruvian production is exported, this has balanced the global fishmeal and fish oil market and helped stabilize prices. Fishmeal prices in the EU showed a declining trend throughout the second half of 2018. Fish oil prices came down from the very high level seen in the beginning of 2018 when price was above EUR 1.750/tonne. Fishoil prices reached a bottom in June last year and has since then increased to around EUR 1.450/tonnes.

### 5.3 Extra-EU imports

A large share of fishmeal and fish oil consumption in the EU is supplied by imports from non-EU countries. In 2016, comparing production, imports and exports, 50% of the fish meal consumption was sourced from non-EU countries.

In 2018, fishmeal imports amounted to 268.960 tonnes and EUR 356 million, increasing by 39% in terms of volume and by 46% in terms of value compared with 2017. The top three suppliers were Norway, Iceland and the Faroes, constituting 46% of the volume and almost 50% of the value. Imports from Norway increased by 57%, reaching 56.900 tonnes, and value increased by 66% to EUR 82.190 million.

EU imports of fish oil in 2018 reached 216.753 tonnes, valued at EUR 333 million. This was a 18% increase in volume and a 22% increase in value from 2017. The top three suppliers were Peru, Norway and the US, accounting for 64% of total volume and 54% of total value. Imports from Peru increased by 76%, to 61.891 tonnes while their value increased by 66% to EUR 89 million.

Table 3. **EXTRA-EU IMPORTS OF FISHMEAL BY COUNTRY OF ORIGIN (volume in tonnes, value in 1000 EUR)**

Country of origin	2013		2014		2015		2016		2017		2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Norway	45.500	41.540	51.860	46.600	67.400	78.230	44.590	61.800	36.280	49.460	56.940	82.190
Iceland	58.500	82.050	13.700	18.380	51.380	77.360	20.370	31.630	33.660	40.750	36.400	51.530
Faroe Islands	11.990	15.100	10.450	13.000	13.980	19.400	11.130	16.240	16.890	21.240	30.040	42.380
Peru	112.500	136.200	150.910	181.010	45.400	60.010	63.690	86.660	18.630	23.800	27.900	34.700
Morocco	25.060	26.270	29.340	29.550	35.130	46.320	50.600	61.810	28.180	29.660	27.990	30.460
Chile	37.560	48.730	48.220	58.730	18.060	27.870	18.430	27.110	20.170	25.880	19.430	26.850
Mauritania	23.570	25.860	39.510	38.180	16.830	21.360	29.490	37.070	10.310	12.760	21.230	25.970
Other	19.690	24.430	28.440	35.120	30.820	42.720	45.340	62.650	28.730	40.090	49.030	62.350
<b>Total EU</b>	<b>334.370</b>	<b>400.180</b>	<b>372.430</b>	<b>420.570</b>	<b>279.000</b>	<b>373.270</b>	<b>283.640</b>	<b>384.970</b>	<b>192.850</b>	<b>243.640</b>	<b>268.960</b>	<b>356.430</b>

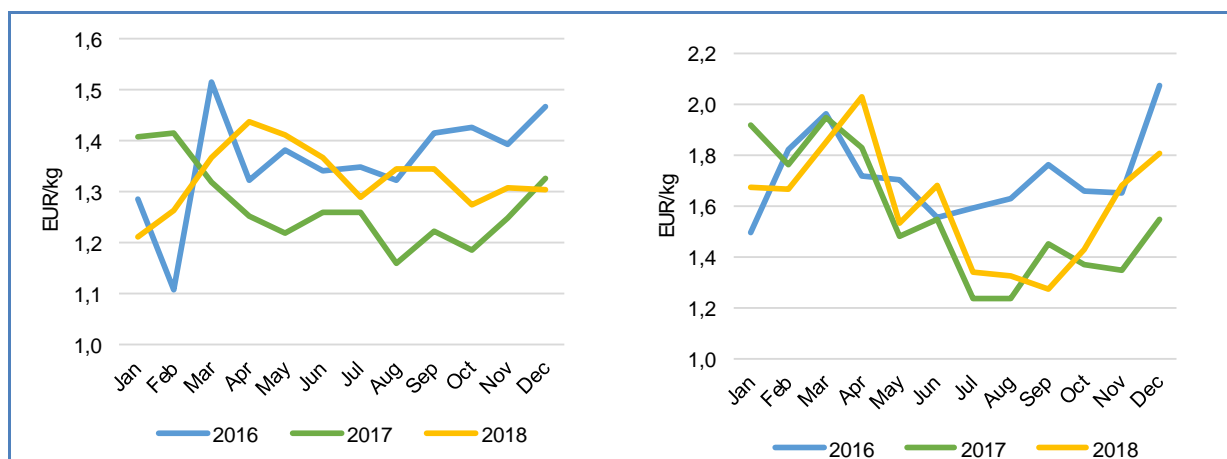
Source: EUMOFA.

Table 4. **EXTRA-EU IMPORTS OF FISH OIL BY COUNTRY OF ORIGIN (volume in tonnes, value in 1000 EUR)**

Country of origin	2013		2014		2015		2016		2017		2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Peru	39.710	66.840	59.080	90.220	58.110	90.020	21.980	47.540	35.190	53.660	61.890	89.230
Norway	45.880	58.410	40.490	46.460	54.970	59.820	56.930	63.660	51.990	56.770	52.760	61.380
USA	22.520	28.320	26.360	36.430	13.260	25.630	39.900	65.060	25.220	35.540	25.010	29.590
Mauritania	13.770	19.000	15.400	17.310	10.430	15.100	12.700	21.230	15.160	17.440	17.130	24.000
Mexico	1.840	21.470	0	31.310	0	31.520	0	22.700	9.490	20.510	8.000	18.200
Morocco	13.130	7.180	21.480	60	17.550	130	10.920	6.880	8.480	1.080	7.480	14.370
Turkey	4.360	23.710	30	9.070	60	13.210	4.510	16.740	520	18.860	7.210	13.060
Other	30.180	59.170	33.410	50.300	20.880	36.930	29.890	53.360	38.230	69.050	37.270	82.820
<b>Total EU</b>	<b>171.390</b>	<b>284.100</b>	<b>196.250</b>	<b>281.160</b>	<b>175.260</b>	<b>272.360</b>	<b>176.830</b>	<b>297.170</b>	<b>184.280</b>	<b>272.910</b>	<b>216.750</b>	<b>332.650</b>

Source: EUMOFA.

Figure 8. **EXTRA-EU IMPORT PRICES OF FISHMEAL (LEFT) AND FISH OIL (RIGHT)**



Source: EUMOFA.

The average EU import price of fish oil in 2018 was 1,53 EUR/kg, increasing by 3% over 2017. For fishmeal, it was 1,33 EUR/kg, increasing by 6% over 2017.

## 5.4 Extra-EU exports

In 2018, EU exports of fishmeal to non-EU countries totalled 136.926 tonnes, valued at EUR 189 million. This was a 13% decrease in volume and a 12% decrease in value. Norway was the largest destination market, constituting 41% of both volume and value.

In 2018, the EU exported 129.686 tonnes of fish oil valued at EUR 205 million. This was a 3% increase in terms of volume and a 6% increase in value. As with fishmeal, Norway was by far the largest market, accounting for 91% of the volumes and 80% of the export value. The main EU exporting country is Denmark, with 80% (109.000 tonnes) of the fishmeal volumes and 81% (EUR 152 million) of value. For fish oil, Denmark accounted for 85% (110.000 tonnes) of the volumes and 73% (EUR 150 million) of the value in 2018.

Table 5. EXTRA-EU EXPORTS OF FISHMEAL BY COUNTRY OF DESTINATION (volume in tonnes, value in 1000 EUR)

Country of destination	2013		2014		2015		2016		2017		2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Norway	125.530	170.980	159.150	208.100	106.510	154.130	119.380	181.090	62.980	87.460	56.110	77.700
China	17.730	25.290	8.680	11.530	16.620	26.830	9.700	15.040	22.720	29.690	13.900	20.470
Canada	5.200	8.080	5.370	8.040	5.680	9.850	7.100	12.360	8.450	14.210	8.140	13.890
Taiwan	3.630	4.940	3.420	4.540	8.070	11.860	6.410	9.550	10.610	13.270	7.540	10.070
Turkey	5.320	6.690	1.990	2.370	3.180	4.520	1.930	2.720	12.600	15.920	7.600	9.290
United States	1.850	3.310	1.440	2.820	2.790	5.250	4.580	8.830	2.990	6.400	6.100	9.210
Japan	3.260	4.640	1.960	2.810	10.010	16.210	1.240	2.130	5.560	7.820	5.890	7.220
Other	46.270	58.890	42.650	46.360	52.310	85.670	32.200	48.280	30.790	40.730	31.650	41.040
<b>Total EU</b>	<b>208.790</b>	<b>282.820</b>	<b>224.660</b>	<b>286.570</b>	<b>205.170</b>	<b>314.320</b>	<b>182.540</b>	<b>280.000</b>	<b>156.700</b>	<b>215.500</b>	<b>136.930</b>	<b>188.890</b>

Source: EUMOFA.

Table 6. EXTRA-EU EXPORTS OF FISH OIL BY COUNTRY OF DESTINATION (volume in tonnes, value in 1000 EUR)

Country of destination	2013		2014		2015		2016		2017		2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Norway	88.950	139.610	113.370	158.840	92.560	163.500	114.340	190.610	113.710	159.090	117.800	164.650
China	430	3.700	430	4.110	250	3.190	200	4.570	50	2.120	110	6.930
Switzerland	720	5.980	660	2.630	370	1.100	470	1.890	660	2.920	870	4.680
Russia	430	1.570	830	1.520	790	3.110	1.030	3.700	950	3.380	980	4.000
Usa	320	3.570	210	2.020	300	1.360	1.670	3.980	1.240	3.660	1.220	3.600
Canada	1.020	2.490	1.000	2.080	40	300	1.280	3.210	440	1.370	1.150	2.330
Turkey	830	1.390	490	620	190	410	210	610	480	1.310	1.050	1.850
Other	8.530	25.520	4.290	22.500	11.710	38.280	7.850	28.780	8.520	20.450	6.510	17.090
<b>Total EU</b>	<b>101.230</b>	<b>183.830</b>	<b>121.280</b>	<b>194.320</b>	<b>106.210</b>	<b>211.250</b>	<b>127.050</b>	<b>237.350</b>	<b>126.050</b>	<b>194.300</b>	<b>129.690</b>	<b>205.130</b>

Source: EUMOFA.

## 5.5 Outlook

The fisheries destined to the production of fishmeal and fish oil in the EU are limited by both the quotas and the demand for fish for human consumption. Species like herring and Atlantic mackerel were earlier utilized for non-food products to a much larger degree. Today, there are still some volumes of herring utilized for the non-food industry, and small or no volumes of mackerel. The development concerning a switch from non-food uses to human consumption can also be noticed for other species like blue whiting and sprat. Nonetheless, as the catch volumes may fluctuate strongly, the potential surplus cannot be destined for the human consumption markets and will most likely go to the reduction industry, ending up as fishmeal and fish oil. Regarding this, the UN's Food and Agriculture Organisation (FAO) reports that 90% of the fish used in the production of fishmeal and fish oil is "presently unmarketable in large quantities as human food"<sup>54</sup>. Fishmeal and fish oil production also offers a unique opportunity for recycling the otherwise unusable trimmings discarded by the seafood processing sector. The utilization of trimmings for reduction is expected to rise to 49% by 2022<sup>55</sup>. Because of better utilization of trimmings and a stable raw material supply from direct fisheries, fishmeal and fish oil production might increase in the coming years. However, only a marginal share of that growth is likely to come from fish by-products. According to FAO, fishmeal produced from fish by-products will represent 34% of the world fishmeal production in 2030 compared to 30% today. As seen from the quota table, the raw material situation from direct fisheries to the fishmeal and fish oil producers fluctuates from one year to the next. However, production over a longer run will likely be stable as the fisheries are fully exploited with no prospects to increase the catches. The possibility of increasing global production of fishmeal and fish oil from the traditional raw material sources is therefore limited mainly to better utilization of trimmings. While global catches will remain constant, the largest market for fishmeal and fish oil, the aquaculture sector, is growing and will continue to grow for the foreseeable future, according to FAO. Therefore, the aquaculture industry will search for new options to cover their increased needs. There are some possible alternative options to increase the production of marine and land-based proteins and oil (such as krill,

<sup>54</sup> <https://www.seafish.org/article/fishmeal-and-fishoil>

<sup>55</sup> <https://www.seafish.org/article/fishmeal-and-fishoil>

algae, insect-based feeds, marine worms, yeast-based ingredients etc.), but none of these can today compete with the traditional sources, in terms of both volumes and price<sup>56</sup>.

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<sup>56</sup> <https://www.aquaculturealliance.org>

## 6 Market use of marine invasive species in Europe

Species that have been moved, intentionally or unintentionally, as a result of human activity, into areas where they do not occur naturally are called introduced species or alien species. Many of them perish in their new environment but some thrive and start to take over native biodiversity and affect human livelihoods—these are known as invasive species<sup>57</sup>.

When a species establishes in a new environment, it is unlikely to be subjected to the natural controls that kept its population numbers in balance within its natural range. Without such control by predators, parasites or disease, such species tend to increase rapidly, to the point where they can take over their new environment. Marine invasive species have had a significant impact on biodiversity, ecosystems, fisheries and mariculture, industrial development and infrastructure. Managing invasive species in the marine environment (eradication and/or control) presents many more challenges than on land<sup>58</sup>.

Some marine invasive species have become a market opportunity for local fishing communities raising a question: how to balance their management between needs to eradicate invasive species or at least control their impacts and needs to maintain a valuable industry. This case study highlights three examples of marine invasive species in Europe that have been exploited by commercial fisheries: the veined rapa whelk in the Black Sea, the American slipper-limpet in France and the red king crab in Norway.

### 6.1 Veined rapa whelk in the Black Sea

Veined rapa whelk (*Rapana venosa*), is a predatory marine snail which may impact both natural and cultivated populations of oysters, mussels and other molluscs. In areas where it has been introduced it has caused significant changes to the ecosystem. It has a high ecological fitness as evidenced by its high fertility, fast growth rate and tolerance to low salinity, high and low temperatures, water pollution and oxygen deficiency. Long distance dispersal is facilitated by ship ballast water, in which the larvae of the snail is found in its plankton phase<sup>59</sup>. The veined rapa whelk is an invasive species, originally coming from eastern Asia, and was first recorded in the Black Sea during the 1940s<sup>60</sup>.

Veined rapa whelk is associated with a decline in range and density of native mussel settlements, near the Anatolian, Caucasus coasts and Western-Danube shelf region on the Black Sea, which were originally biologically rich areas. Thus, the species has caused important changes in the interaction between fishing and habitat in the coastal waters of the south-eastern Black Sea. While being an introduced species that has attained an important role in the demersal ecosystem of the Black Sea, veined rapa whelk has also become one of the most important commercial species especially for trade.

In Turkey, Bulgaria, and most recently Romania, veined rapa whelk is a resource that is collected, processed and exported, usually to South Korea and Japan. First collected by divers, it is now harvested by vessels dredging for snails. The fishery is managed by a quota system allowing to keep balance between the control of the expansion of the species and maintaining related economic activities<sup>61</sup>.

<sup>57</sup> <https://www.iucn.org/theme/marine-and-polar/our-work/international-ocean-governance/managing-invasive-species>

<sup>58</sup> <https://www.cbd.int/invasive/doc/marine-menace-iucn-en.pdf>

<sup>59</sup> <http://www.iucnqisd.org/qisd/speciesname/Rapana+venosa>

<sup>60</sup> <http://www.issg.org/database>

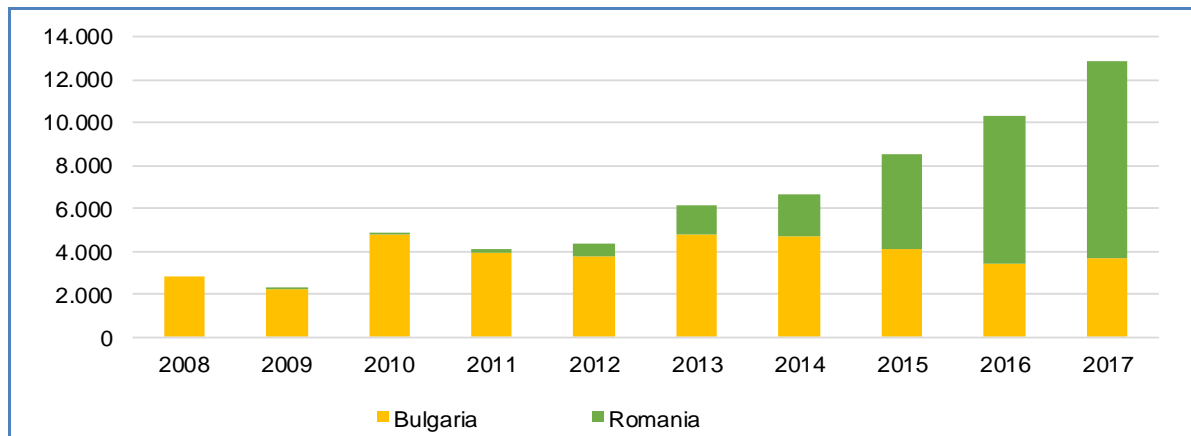
<sup>61</sup> <http://www.eurofishmagazine.com/component/k2/item/374-processing-rapana-for-korean-buyers>



## 6.2 Production

In 2017, landings of rapa whelk in the EU reached almost 13.000 tonnes. The two most important EU fishing countries are Romania (covering 72% of the total volume) and Bulgaria (covering the remaining 28%). Since 2015 Romania has become the main fishing country in the EU in terms of landed volume.

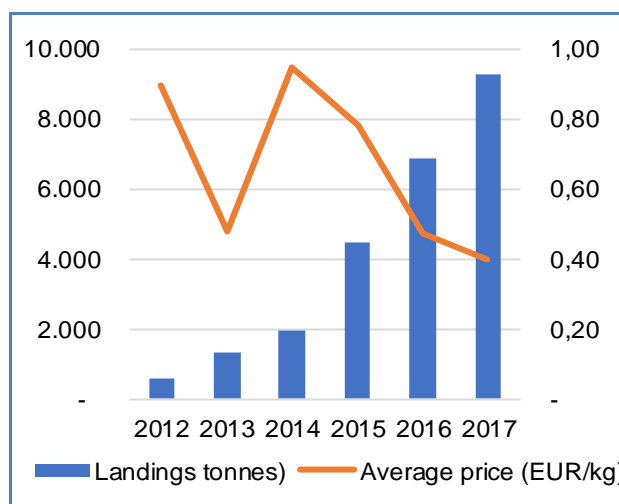
Figure 1. EU LANDINGS OF RAPA WHELK BY COUNTRIES (volume in tonnes)



Source: EUROSTAT.

In Romania, between 2013 and 2014, veined rapa whelk first-sale price increased by 97% following the increase of landings by 49%. From 2014 to 2017, first-sale prices decreased by 50% (from 0,95 EUR/Kg to 0,47 EUR/Kg), following the strong increase of landings from 1.953 tonnes to 9.244 tonnes.

Figure 2. LANDINGS AND FIRST-SALE PRICE OF VEINED RAPA WHELK IN ROMANIA (volume in tonnes, price in EUR/kg)



Source: EUROSTAT.

## Processing

At the processing facility the rapa whelk are first placed in fresh water for a few hours to remove the sand. They are then boiled for a few minutes and immediately afterwards immersed in very cold water. The thermal shock helps to separate the meat from the shell. The meat is then removed from the shell manually, cleaned and graded into one of six sizes before being frozen. The frozen meat is finally packed and shipped to export markets, mostly Korea and Japan<sup>62</sup>.

## Trade

There is not a specific statistical trade code for this species, so it is assumed that products corresponding to the MCS "other molluscs and aquatic invertebrates" cover mostly veined rapa whelk for Romanian and Bulgarian exports. For veined rapa whelk in Bulgaria, the trade balance has been positive over the period between 2008 and 2018. During the same period, imports and exports have increased in value by 338% and 149%, respectively. In 2018, exports reached 2.029 tonnes, at a value of more than EUR 13 million (-9% compared to 2017). The main export destinations were South Korea (50% of export value in 2018), and Japan (33%) and to

<sup>62</sup> <http://www.eurofishmagazine.com/component/k2/item/374-processing-rapana-for-korean-buyers>

a lesser extent China, Greece, and Vietnam. In the same year, imports were mainly from Romania, with 86% of imports (import figures may include other molluscs than *Rapana venosa*).

In Romania, the trade balance was negative between 2012 and 2015. Between 2008 and 2011, exports largely exceeded imports. The same has been observed between 2016 and 2018. In 2018, 1.252 tonnes of *Rapana venosa* were exported for a value of EUR 2,5 million, mainly to South Korea, with 55% of export value, and Japan (19%).

Table 1. **TRADE FLOWS FOR VEINED RAPA WHELK<sup>63</sup> IN ROMANIA AND BULGARIA (value in 1000 EUR)**

Species	Flow type	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Romania	Export	2.542	3.045	4.306	5.115	234	289	332	779	2.510	2.475	2.466
	Import	839	720	749	1.219	657	630	571	894	834	819	1.003
	<b>Trade balance</b>	<b>1.703</b>	<b>2.325</b>	<b>3.557</b>	<b>3.896</b>	<b>-423</b>	<b>-340</b>	<b>-238</b>	<b>-114</b>	<b>1.676</b>	<b>1.656</b>	<b>1.463</b>
Bulgaria	Export	5.387	4.407	6.228	4.764	4.269	4.034	5.350	6.533	8.646	14.685	13.391
	Import	365	370	177	319	246	443	480	797	1.376	963	1.600
	<b>Trade balance</b>	<b>5.022</b>	<b>4.036</b>	<b>6.051</b>	<b>4.445</b>	<b>4.023</b>	<b>3.590</b>	<b>4.870</b>	<b>5.736</b>	<b>7.270</b>	<b>13.722</b>	<b>11.791</b>

Source: COMEXT.

### 6.3 American slipper-limpet in France

American slipper-limpets or Crepidulae (*Crepidula fornicata*) are gastropod molluscs originating from the Atlantic coast of North America. They are usually found in colonies in sheltered areas such as shallow bays or estuaries. They can be attached to a wide variety of seabed: rocky bottom, gravel, sand or mud, and form a chain of individuals stacked on top of each other. They usually sit in stacks on a hard substrate, e.g., a shell of other molluscs, boulders or rocky outcroppings. They feed on phytoplankton by filtration, as algae or bacteria and suspended solids. In general, females can lay twice a year, between 5.000 and 30.000 eggs per spawn grouped in protective capsules. After hatching, the larvae experience a 4 to 5-week pelagic phase which favours their dispersal. Their growth is very fast, and the males can reproduce at the age of 4 months<sup>64</sup>.

The slipper-limpet has all the characteristics of an invasive species: a very effective reproduction strategy, high ecological tolerance (it tolerates a wide range of environmental factors), feeding mode (a filter, which is poorly limiting), and an absence of predators.

First introduced to Europe unintentionally with American oysters to England in the 1870s, the slipper limpet spread along the European coasts, and is now found along the Atlantic coast from Spain to Denmark with records also in the Mediterranean Sea and southern Norway<sup>65</sup>. They probably have been introduced again when the Allies landed in France in 1944. It has especially proliferated for thirty years in Normandy and on the northern coast of Brittany, in France<sup>66</sup>.

This population increase has had significant effects on the environment in the most densely colonized areas (modification to the sediment and biodiversity), leading to the emergence of a new benthic ecosystem. Anthropogenic dredging activities are among the causative factors of the spread. But the slipper-limpet competes for space and feed with some commercial species as scallop, mussel or oyster<sup>67</sup>. After decades of expansion and given the size of its population (estimated at 1,5 million tonnes in Brittany), its introduction and development are considered irreversible.

However, the meat of slipper-limpet is appreciated for its finesse and taste, especially in USA, in Canada and Asia. French processors have tried to find a way to harvest and process this huge shellfish stock, turning this harmful invasion into a market opportunity. Since 2008, a French company, Atlantic Limpet Development (ALD), is working on finding an economic model for fishing, processing, marketing and promoting this species. From 2013, one fishing vessel has been authorized - on an experimental basis - to fish (dredging) on the Atlantic slipper-limpet stock in the Bay of Cancale in Brittany. Landings started at 200 tonnes in 2012 to reach 400 tonnes in 2016. Once separated from the shell, the meat was immediately cleaned and frozen and packed to be shipped. The shell of slipper-limpet was then used for non-food purposes: amendments for agriculture (as it is composed of 97% of calcium carbonate) or use for building draining pavements<sup>68</sup>.

However, back then, the market for slipper-limpet was still underdeveloped in France and the production targeted export markets, specifically to the United States and Asia, and high-end restaurants. So the targeted markets were export markets (namely North America, but also Italy and Spain as a substitute of clams), foodservice sector and processed meals industry. In addition, the

<sup>63</sup> CN8 codes corresponding to other molluscs and aquatic invertebrates (excluding mussel, oyster and other main commercial shellfish species).

<sup>64</sup> <http://issg.org/database/species/ecology.asp?si=600&fr=1&sts=%20ang=EN&ver=print&prtflag=false>

<sup>65</sup> [https://www.researchgate.net/profile/David\\_Thieltges/publication/223459194\\_Too\\_cold\\_to\\_prosper\\_Winter\\_mortality\\_prevents\\_population\\_increase\\_of\\_the\\_introduced\\_American\\_slipper\\_limpet\\_Crepidula\\_fornicata\\_in\\_northern\\_Europe/links/59db47160f7e9b18c2e32b48/Too-cold-to-prosper-Winter-mortality-prevents-population-increase-of-the-introduced-American-slipper-limpet-Crepidula-fornicata-in-northern-Europe.pdf](https://www.researchgate.net/profile/David_Thieltges/publication/223459194_Too_cold_to_prosper_Winter_mortality_prevents_population_increase_of_the_introduced_American_slipper_limpet_Crepidula_fornicata_in_northern_Europe/links/59db47160f7e9b18c2e32b48/Too-cold-to-prosper-Winter-mortality-prevents-population-increase-of-the-introduced-American-slipper-limpet-Crepidula-fornicata-in-northern-Europe.pdf)

<sup>66</sup> <https://wwz.ifremer.fr/Espace-Presse/Dossiers-thematiques/La-crepidule-se-cherche-une-nouvelle-image>

<sup>67</sup> <https://archimer.ifremer.fr/doc/00000/6351/>

<sup>68</sup> <http://www.lacrepidule.com/language/en/description/>

company was expecting on the international recognition of the MSC label to introduce the slipper-limpet on the market for sustainable seafood products. Unfortunately, due to lack of immediate commercial outlets, the company had to cease its activity in 2016, waiting for new investors. However, in 2017, another French company specialised in seafood processing and marketing has taken over the promising company with its unique patented process but so far the production of processed slipper-limpet has not started again.

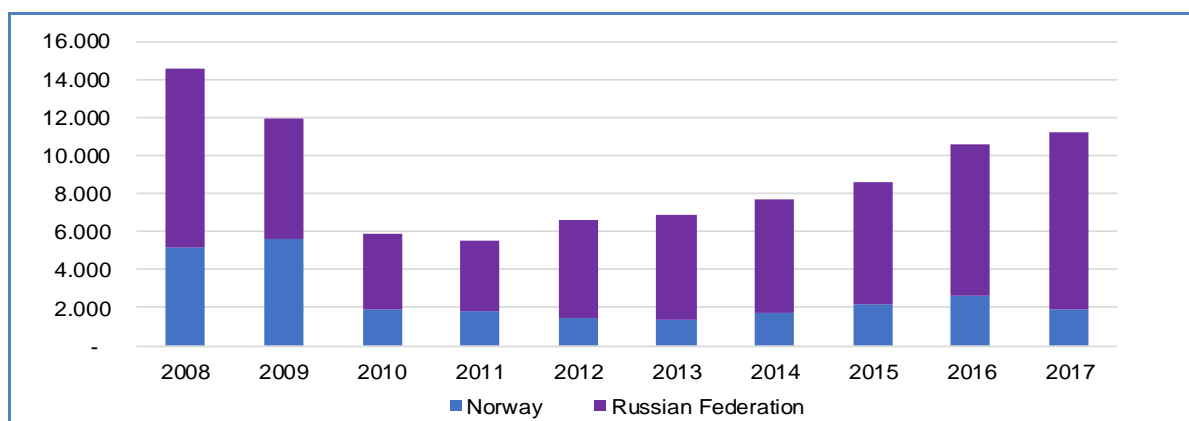
## 6.4 Red king crab in Norway

The red king crab (*Paralithodes camtschaticus*) is native to the Okhotsk and Japan Seas, the Bering Sea, and the northern Pacific Ocean, where it is an important economic resource. In Alaskan waters, red king crabs have historically been the second most valuable species to fishermen after salmon, although since the 1980s overharvesting has led to the closure of some areas to fishing. The red king crab also has an invasive distribution in the Barents Sea, since its introduction in the 1960s, when Red king crab has been deliberately stocked into the Murman coast by Russian scientists for commercial fishery. The population has then increased steadily and expanded its range, which now spans from Sørøya, Norway in the west and Kolguev Island, Russia in the east, and to about 72° north<sup>69</sup>. Soon after this the population skyrocketed, and the majority of fjords in Northern Norway are now occupied by the crab. Their removal of larger bivalves and echinoderms has led to lower diversity and abundance in Norwegian fjords, particularly among species with low motility, and subsequent changes in the entire community composition of local ecosystem<sup>70</sup>. To tackle the expansion of the species, commercial fisheries have been authorized in the early 2000s and a very valuable fishing industry started to harvest red king crab in the Barents Sea. Although red king crab has a negative impact on local biodiversity, it had a positive effect on the Norwegian fishery sector economy, the species being one of the most valuable crab on the market.

## 6.7 Production

In North-East Atlantic, catches of red king crab reached 11.246 tonnes in 2017, 83% attributable to Russian fleet and 17% to Norwegian fleet. Since 2010, catches have been rising (+92%), especially due to Russian production, which remains, however, still below the 2008 peak-level (14.538 tonnes).

Figure 3. **NORTHEAST ATLANTIC CATCHES OF RED KING CRAB BY MAIN FISHING COUNTRIES (volume in tonnes)**



Source: FAO.

Norway has been fishing red king crab (*Paralithodes camtschaticus*) for many years now. Currently the practice for the Norwegian authorities is to maintain a certain capacity in some areas (and maintain the economic added value for the industry), whilst aiming for fishing to eradication in areas further south to prevent spreading<sup>71</sup>. In 2017, the quota was set at 1.750 tonnes, and Norway exported 1.900 tonnes during that year. In 2019, there is a 20% cut in the red king crab quota to 1.400 tonnes of male crab and 100 tonnes of female crabs. Also, the minimum shell size has been increased to 130 millimetres<sup>72</sup>. In 2019, the TACs for red king crab have been reduced both in Alaska and in Norway. Supplies may therefore be tighter in 2019, as will snow crab supplies leading to potential increasing prices<sup>73</sup>.

<sup>69</sup> <https://www.grida.no/resources/7734>

<sup>70</sup> <http://sciencenordic.com/content/norway%E2%80%99s-new-invaders-red-king-crab>

<sup>71</sup> <http://sciencenordic.com/content/norway%E2%80%99s-new-invaders-red-king-crab>

<sup>72</sup> Ministry of Trade, Industry and Fisheries of Norway.

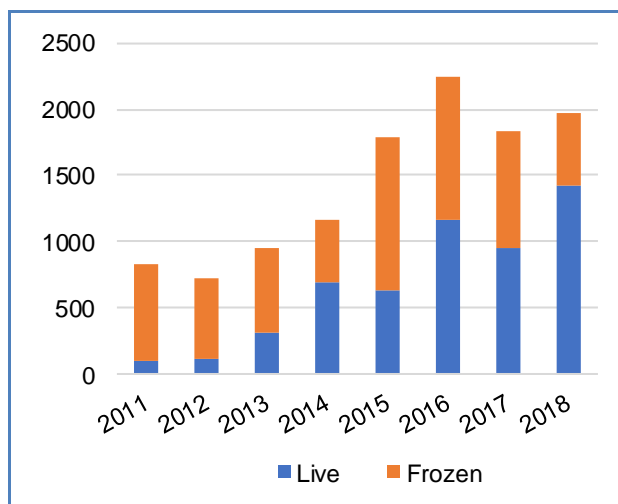
<sup>73</sup> <http://www.fao.org/in-action/globefish/market-reports/resource-detail/en/c/1189975/>

## 6.8 Trade

Most of the red king crab caught by the Norwegian fleet is exported to third countries. In 2018, Norwegian exports of red king crab reached 1.977 tonnes for a value of EUR 60 million. In value terms, live crab accounted for 67% of exports and frozen crab accounted for 33% of exports. The main destinations for live red king crab exports were South Korea (57% of live crab export value in 2018) and to a lesser extent the USA (15%), Canada (9%) and the EU (9%). For frozen products the main destination was by far the EU (76% of the total value) and to a lesser extent Japan (11%) and Vietnam (4%).

Since 2011, the volume of red king crab exports from Norway has grown, with a peak at 2.239 tonnes (for EUR 57 million) reached in 2016. Moreover, the share of live products in the total export volume has strongly increased leading to an increase of the average export price.

Figure 4. **NORWEGIAN EXPORTS OF RED KING CRAB OVER 2011–2018 PERIOD (volume in tonnes)**



Source: SSB (Statistics Norway).

## 7 Saithe fresh fillet in France<sup>74</sup>

### 7.1 World and EU catches

World production of saithe was 298.086 tonnes in 2016<sup>75</sup>. The main producers were Norway (154.000 tonnes, accounting for 52% of the world catches), Iceland (50.000 tonnes), the European Union (41.000 tonnes), and the Faroe Islands (32.000 tonnes).

The EU accounted for 14% of world catches of saithe. The main EU fishing countries were France (35%), the UK (30%), Germany (18%), and Denmark (10%). Significant volumes of saithe are also caught by Swedish, Irish and Polish fleets.

Between 2006 and 2016, EU catches of saithe have experienced a 40% decrease, from more than 67.000 tonnes in 2006 to 41.000 tonnes in 2016. France (-43%), Germany (-58%) and Denmark (-46%) suffered the biggest decreases, whereas the UK only experienced a 9% decrease of saithe catches. These decreases are mostly the result of the evolution of total allowable catches (TACs) and quota management system implemented through the Common Fisheries Policy (CFP).

### 7.2 Structure of the EU market

#### Apparent consumption<sup>76</sup>

EU apparent consumption of saithe was 149.961 tonnes live weight equivalent (lwe) in 2016. France was the leading Member States for saithe consumption with 41.949 tonnes (lwe), followed by Germany (28.935 tonnes), Poland (13.897 tonnes) and Sweden (11.240 tonnes). Consumption in other MS was below 10.000 tonnes (lwe).

#### Imports

The main EU importers are Germany, France, Denmark, the Netherlands, and Poland. In 2016, each of these countries imported between 11.000 and 26.000 tonnes of saithe valued between EUR 29 million and EUR 71 million.

Between 2006 and 2016, the value of imports of saithe increased by 13–15% in Germany, France, the Netherlands, and Poland. The only exception is Denmark, with a 18% decrease. In terms of volume, imports decreased in all Member States (between 17% and 34%). Overall, the average price of saithe has increased, and trade has also evolved towards products with higher price (e.g. fresh fillets) than others (whole fish or frozen fillet).

Regarding the imports in the main EU Member States, Germany and the Netherlands mainly import frozen fillets, which accounted for 59% of the volume imported in 2016 in Germany and 66% in the Netherlands. Imports to Germany mainly come from Denmark, the Netherlands and Iceland. Imports to the Netherlands mainly come from Iceland, Faroe Islands and Norway. Imports in France are composed of frozen fillets (38% of volume), fresh fillets (38%) and fresh whole saithe (31%). Over the last decade, the imports of fresh fillets largely increased (four times higher in 2016 compared to 2006) while frozen fillets, frozen meat and frozen whole saithe decreased. Imports to France mainly come from Denmark, the UK and the Netherlands.

Main products imported in Denmark are fresh whole saithe (84% of imported volume). The imports of fresh whole fish have almost doubled in value between 2006 and 2016 (+92%). The import of fresh whole saithe is related, to some extent, to the landing of saithe from vessels from other Member States. Imports to Denmark mainly come from Norway, Germany, France and Faroe Islands. In Poland, main products imported were fresh whole fish (44% of volume imported) and frozen fillets (37%). Over the 2006–2016 period, imports of frozen fillets have largely increased (+35% in volume). Imports to Poland mainly come from Sweden and Denmark.

#### Exports

The main EU exporters of saithe are the Netherlands, Denmark, and Germany. Dutch exports largely increased between 2006 and 2016. In 2016, exports were three times as high in terms of volume and five times as high in value compared to 2006. Frozen fillets accounted for 58% of volume and 67% of value; frozen whole saithe accounted for 24% of volume and 10% of value. The main destinations for Dutch exports are France and Germany. In 2016, the main products exported by Denmark were fresh whole saithe (55% of volume in 2016) and fresh fillets (27% of volume). Between 2006 and 2016, exports of fresh whole saithe increased by 57% and reached 11.943 tonnes in 2016. However, total export volumes largely decreased over the same period (-31%), with a collapse in 2011 (-9.351 tonnes), mainly due to a decrease of frozen fillet exports (imports of frozen fillet to Denmark largely decreased in the same year). Apparent consumption for saithe is low in Denmark (3.310 tonnes lwe in 2016), even if trade is important with 35.679 tonnes lwe imported and 37.463 tonnes lwe exported in 2016. Germany is the main destination for Danish exports. The most exported product from Germany in 2016 was fresh whole saithe (51% of the volume in 2016 with 4.443 tonnes). German exports dropped by 49% in volume and 12% in value between 2006 and 2016; the volume exported decreased for each

<sup>74</sup> EUMOFA has published a more comprehensive analysis on saithe fresh fillets in France in September 2018. The report is available for download under "Studies and reports" and "Price structure analysis" at <http://www.eumofa.eu/market-analysis>.

<sup>75</sup> FAO.

<sup>76</sup> The method for calculation of the apparent market is as follows: volume of apparent consumption = volume of catches + volume imported – volume exported. The volumes are live weight equivalent, specific conversion factors are used to calculate the live weight equivalent for each type of product.

of the main products. The moderate decrease in value is due to the price increase for frozen fillets, which account for 36% of volume and 57% of value (4,20 EUR/kg in 2016 vs 2,71 EUR/kg in 2006). The main destination for German exports is Denmark.

### 7.3 The French market

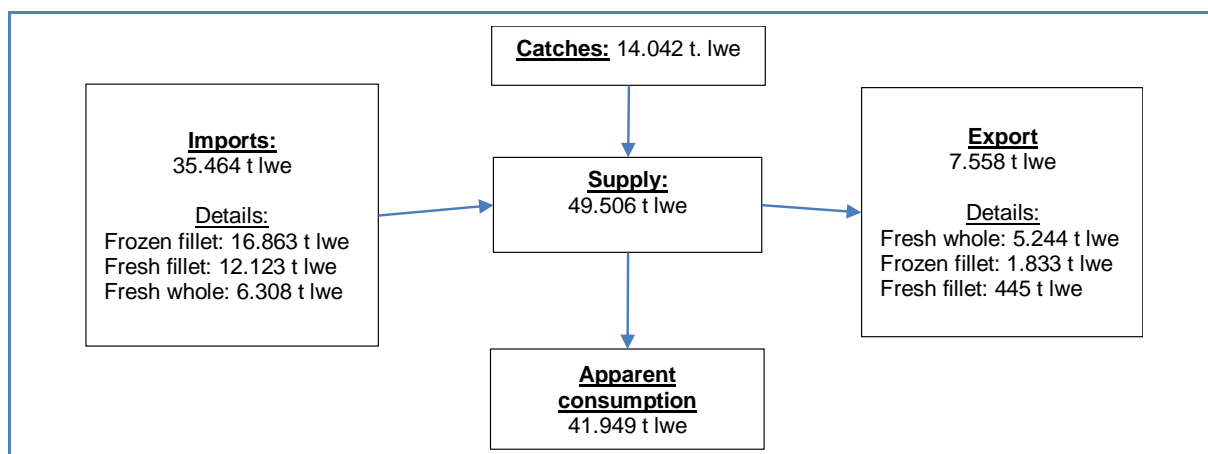
#### Supply Balance

French catches reached 14.042 tonnes in 2016. Most French landings take place in the UK (5.038 tonnes in 2016), followed by Denmark (3.962 tonnes lwe), and France (2.958 tonnes)<sup>77</sup>. According to interviewed stakeholders, landings in the UK are transported by truck to France and the first sale takes place in France. Landings in Denmark by French vessels may be sold in Danish auctions (in particular in Hanstholm) and are thus considered as French exports to Denmark. Saithe caught by the French fleet may be landed as whole fresh gutted fish and as frozen fillets (frozen fillets are landed in France).

Imports (35.464 tonnes lwe in 2016) are mainly composed of frozen and fresh fillets. Exports reach 7.558 tonnes lwe and are both fresh whole saithe and frozen fillet. Exports for whole fresh fish may cover landings from the French fleet in Denmark.

Based on data available, apparent consumption of saithe was 41.949 tonnes lwe in 2016. Supply largely relies on imports (72%). Apparent consumption decreased between 2006 and 2016 (it peaked at 69.936 tonnes in 2008). Based on interviews, the main markets for saithe are large scale retailers and HORECA (in particular mass catering) and to a lesser extent fishmongers.

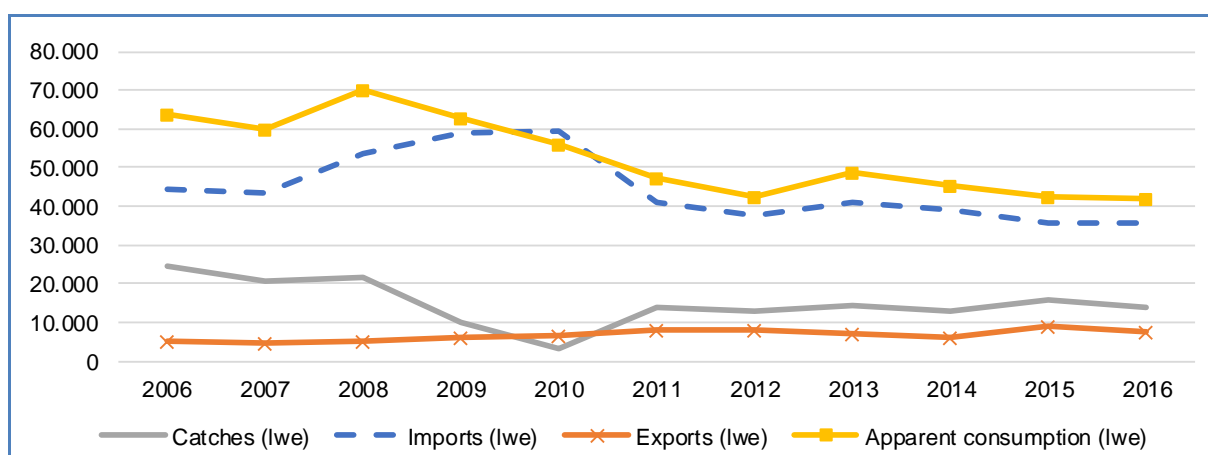
Figure 1. **SUPPLY BALANCE OF SAI THE IN FRANCE IN 2016**



Source: EUMOFA, based on FAO, Eurostat COMEXT.

The apparent supply decreased between 2006 and 2016, due to a strong decrease of imports and catches. Apparent consumption peaked in 2008 at 69.936 tonnes lwe (compared to 41.949 tonnes in 2016).

Figure 2. **EVOLUTION OF APPARENT CONSUMPTION OF SAI THE IN FRANCE IN 2006 – 2016**



Source: EUMOFA, based on FAO, Eurostat COMEXT, Eurostat.

<sup>77</sup> EUROSTAT.

## French imports

In 2016, French imports reached EUR 66,4 million (+15% compared to 2006) and 17.246 tonnes (-26% compared to 2006). Imports were mainly composed of frozen fillets (43% of value), fresh fillets (37% of value) and fresh whole saithe (18% of value).

- **Fillet: frozen and fresh**

Fillet imports decreased by 21% in volume between 2006 and 2016. We can observe a large decrease (-5.570 tonnes) of frozen fillets while fresh fillets increased (+3.185 tonnes). In 2016, frozen fillets still accounted for the largest share of saithe's fillet imports in volume (58% of fillets imported in France).

The decrease of frozen fillets is in particular due to a reduction of imports from Denmark (764 tonnes in 2016 vs 6.276 tonnes in 2006).

Almost all the fresh fillets imported in France come from Denmark and the UK (94% of fresh fillets imported in 2016). The price of fresh fillets remains higher than that of frozen fillets (5,22 EUR/kg and 3,72 EUR/kg, respectively). Both prices largely increased between 2006 and 2016 (+43% and +39%).

- **Fresh whole**

Most imports of fresh whole saithe come from Denmark and the UK (84% of the volume imported in France in 2016), which are the two main EU landing countries for saithe.

Volumes peaked in 2009 at 10.341 tonnes and have since halved, with 5.301 tonnes imported in 2016. Price has constantly increased over the last decade and was 2,13 EUR/kg in 2016 (1,32 EUR/kg in 2006).

## French exports

French exports were EUR 7,4 million and 5.530 tonnes in 2016, more than two times higher in 2016 than in 2006. Fresh whole saithe and frozen fillet accounted for 94% of French exports for saithe's products in 2016<sup>78</sup>

- **Fresh whole**

Exports of fresh whole saithe largely increased over the last decade, from 503 tonnes in 2006 to 4.407 tonnes in 2016. Denmark accounts for 90% of the volume exported. Based on interviews, we consider that most of this flow is related to saithe's landings by the French fleet in Denmark (in particular in the port of Hanstholm, which is a major landing site for saithe, with 14.088 tonnes landed in 2016 based on EUMOFA), where the fish is sold through auctions.

- **Frozen fillet**

Frozen fillet exports have changed significantly over the last decade. They decreased by 20% in value and 53% in volume between 2006 and 2016. Exports reached 1.530 tonnes in 2006, mainly directed to Germany, Spain, Poland, and Belgium. In 2016, only Germany and Poland were still significant markets (in 2016, Germany, Croatia, and Poland accounted for 73% of the volumes exported).

Exports of frozen fillets from France to Germany even stopped for two years (2009 and 2010) while exports from France to Poland started to grow. Germany is one of the main EU importers of saithe's frozen fillets (5.005 tonnes in 2016), for which France is a minor supplier (maximum 5,5% in 2012).

## Market segmentation

The EU market for saithe is segmented along three main criteria: preservation, presentation and size. However, recently, eco-certified products have added a new segment in the saithe market.

- **Presentation/preservation:** Saithe is marketed as fresh whole or in fillets (skin-on/skin-off), steaks, loins and flanks. As saithe is targeted by freezer trawlers, a significant volume of frozen fillets, cuts (IQF<sup>79</sup>) or blocks, is processed onboard. Saithe can also be marketed frozen whole headed and gutted but also, to a lesser extent, salted-dried or preserved.
- **Size:** the most common size is 30 to 110 cm. The volume for main commercial categories ranges between 0,3 kg to more than 5 kg for fresh whole saithe (according to the EU marketing standards for fresh fish) and from 0,4 kg to more than 0,6 kg for fresh fillet or loins (according to interviews with operators).

Differences in freshness can also impact segmentation. For example, in a bottom trawler landing fresh fish, saithe caught in the last three days of the fishing trip are more valued than the rest of the catches<sup>80</sup>. Based on interviews with wholesalers and a retailer, saithe is a medium range product among the whitefishes. Its positioning in the market stands between cod, salmon, haddock, and hake on one hand and Alaska pollock or pangasius on the other hand. Operators indicate that market change about other species may impact saithe sales. For instance, if cod or haddock prices decrease, consumers may buy these products instead of saithe, thus driving down its sale. Saithe is consumed in different forms on the French market. The most common forms are fresh and frozen fillets. There are several types of fillets: with or without skin, with or without flank. Large scale retailers tend to ask for fillets without

<sup>78</sup> Based on Eurostat/COMEXT.

<sup>79</sup> Individually Quick Frozen

<sup>80</sup> [http://pdm-seafoodmag.com/guide/poissons/details/product/Lieu\\_noir.html](http://pdm-seafoodmag.com/guide/poissons/details/product/Lieu_noir.html)

flank as a preventive measure to avoid parasites such as Anisakis. Wholesalers observe the development of saithe' loins. Loins are a part of the fillet; the advantage is that its thickness is regular and may be cut in several pieces. This is in particular required by mass catering as this eases the preparation for cooks and allows to propose homogenous pieces of fish to consumers. The disadvantage of loins is the lower yield at processing stage. This increases the costs.

## 7.4 Price transmission in the supply chain

This section details the outcome of two analyses of price transmission in saithe's supply chain in France:

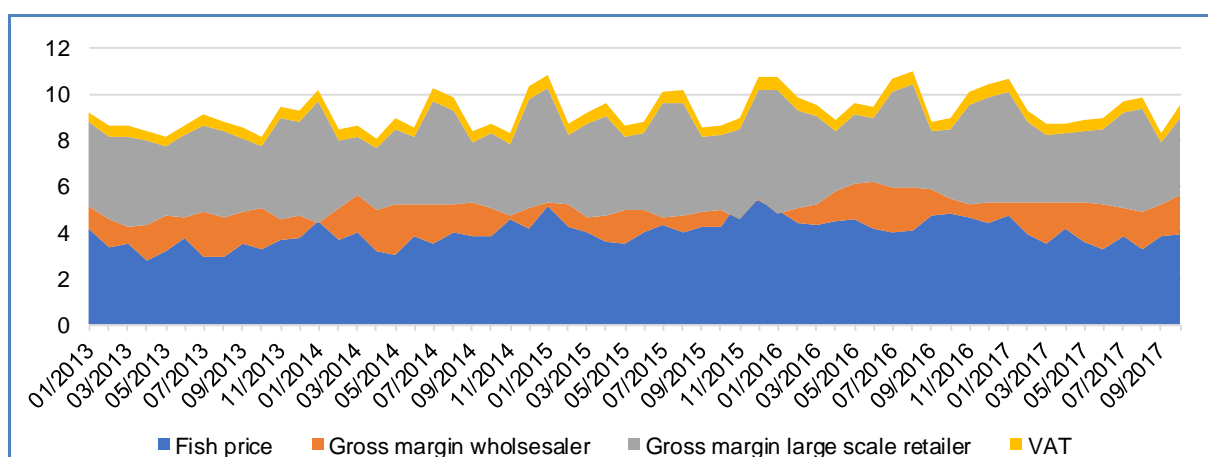
- The first analysis is the results from the French observatory on the formation of food products prices and margins ("Observatoire de la formation des prix et des marges des produits alimentaires") which followed the evolution of prices and margins at the different stages of the fresh saithe's supply chain between 2013 and 2017.
- The second analysis is a price transmission analysis conducted by EUMOFA. It details the different prices, costs and margin at the different stages of the supply chain for the fresh fillet of saithe in France in 2017, this is based on available statistics and stakeholders interviews.

### Price and margin of fresh saithe at the different stages of the supply chain between 2013 and 2017

The French observatory on the formation of food products prices and margins ("Observatoire de la formation des prix et des marges des produits alimentaires") from FranceAgriMer covers, among other food products, fresh saithe. Based on this analysis and data from 2013 to 2017:

- **Fish price for wholesaler** ranges between 2,80 and 5,40 EUR/kg. Price tends to be lower in May and April (when volumes landed are higher) while it increases in June and during winter. In addition, prices tend to decrease since January 2017 (between 3,26 EUR/kg to 4,17 EUR/kg).
- **Gross margin for wholesaler** ranges between -0,82 EUR/kg and 2,15 EUR/kg. Negative gross margin was observed three times while fish prices tended to be high (over 4,50 EUR/kg). In a context of high price for raw material, wholesalers tend to decrease their margin or even lose money.
- **Ex-wholesaler price** ranges between 4,22 EUR/kg and 6,12 EUR/kg.
- **Large scale retailer gross margin** ranges between 2,51 to 5,35 EUR/kg, the highest margins are in July–August and December–January, when prices are the highest.
- **VAT:** 5,5%.
- **Price for final consumer in large-scale retailers:** Two peaks can be observed each year: in December–January and June–August. Prices have tended to increase since 2013: from 8,14–9,44 EUR/kg in 2013 to 8,30–10,66 EUR/kg in 2017 (January to October 2017). However, prices tended to be lower in 2017 compared to 2016.

Figure 3. PRICES AND MARGINS OF SAITHE AT THE DIFFERENT STAGES OF THE SUPPLY CHAIN IN 2013–2017



Source: Observatoire de la formation des prix et des marges des produits alimentaires – FranceAgriMer.



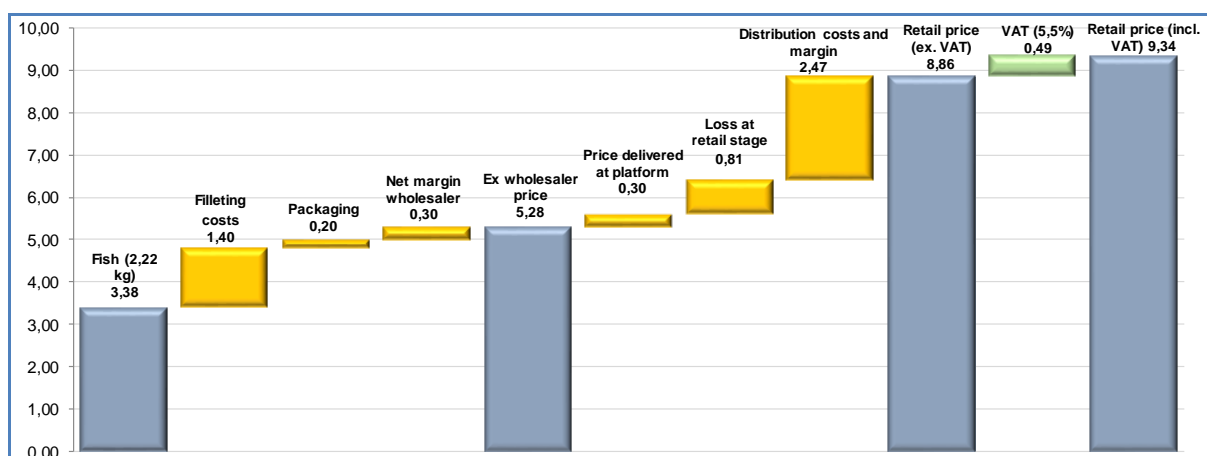
## Price and margin of fresh saithe at the different stages of the supply chain between 2013 and 2017

For the present analysis, data on first sale price for fish is based on EUMOFA statistics (first sale price at French level), other data are based on interviews with wholesalers and a retailer (filleting yields, filleting costs, packaging costs, loss and costs at retail stage, final consumer price). The prices at the different stages are cross-checked with other sources of information: import price from EUROSTAT/COMEXT and data from the French observatory on formation of food products' prices and margins (FranceAgriMer).

Main findings from the price transmission analysis:

- **Fish price:** 1,52 EUR/kg: average price for French first sales of saithe in 2017<sup>81</sup>. This price is lower than in 2016 and lower than the price of imported fresh saithe (comparison of price in 2016: 2,13 EUR/kg for imported whole saithe versus 1,80 EUR/kg for national landings).
- **Filleting yield:** 45%. Filleting yields differ in function of the type of products (based on interviews):
  - fillet with flank: 50%,
  - fillet without flank: 45%,
  - loin: 25-30%: lower yield for loin compared to fillet, this increases the price of this product compared to fillet.
- **Filleting costs** range between 1,30 and 1,60 EUR/kg<sup>82</sup>.
- **Packaging:** 0,20 – 0,30 EUR/kg<sup>83</sup>.
- **Ex-wholesaler price** is 5,28 EUR/kg, this is comparable to the price of imported fresh fillet in France in 2016: 5,22 EUR/kg<sup>84</sup>.
- **Loss at retail stage** account for 0,81 EUR/kg. Losses are related to loss of water and loss of product due to high fragility of products (need to maintain freshness)<sup>85</sup>.
- **The consumer price** retained for the analysis is 9,34 EUR/kg. Based on FranceAgriMer, saithe's final price for the consumer is 9,26 EUR/kg in 2017. Based on interviews and a price survey at retail stage, the retail price for fresh fillets ranges between 9,00 and 9,95 EUR/kg without discount and between 6,95 and 7,95 EUR/kg with discount. Based on store check, frozen loin may be sold between 13,25 and 17,76 EUR/kg.

Figure 4. PRICE TRANSMISSION OF SAI THE FILLET (EUR/kg)



Source: Elaboration by EUMOFA from statistics and interviews with stakeholders in January 2018.

<sup>81</sup> EUMOFA.

<sup>82</sup> Interviews.

<sup>83</sup> Interviews.

<sup>84</sup> Eurostat/COMEXT.

<sup>85</sup> Interviews.

## 8 The EU canned tuna industry

### 8.1 Introduction

Tuna (mostly canned) has been for years the most consumed species in the EU, ahead of cod and salmon. In 2016, its apparent consumption amounted to 2,78 kg per capita (live weight equivalent), representing 11,4% of total consumption of fisheries and aquaculture products<sup>86</sup>.

With an average annual production of more than 350.000 tonnes, the EU canned tuna industry supplies 46% of the EU market, with Spain, Italy, Portugal and France as main producers.

It provides 20.140 direct jobs in the EU and 60.660 indirect jobs in the supporting sectors<sup>87</sup>.

The European tuna sector is vertically integrated, bringing together fishing companies, canners and distributors.

The European tuna industry is an important socio-economic activity. It consists of two major sectors: the EU tuna fishing fleet, which counts 30 Spanish and 22 French purse seiners, and the processing and canning sector. Both sectors are complementary and interdependent.

### 8.2 Production

#### Evolution

Table 1. **EU CANNED TUNA PRODUCTION (volume in 1000 tonnes product weight)**

EU Member State	2012	2013	2014	2015	2016	2017
Spain	239	235	237	238	239	241
Italy	66	64	64	74	82	84
Portugal	18	21	21	20	24	23
France	18	18	20	20	20	21
Other	4	4	4	4	4	5
<b>Total</b>	<b>345</b>	<b>342</b>	<b>346</b>	<b>356</b>	<b>369</b>	<b>374</b>

Source: ANFACO for Spain, Eurostat/Prodcom for other Member States.

The EU produced 374.000 tonnes of canned tuna in 2017. Spain is by far the leading producer, accounting for 64% of total EU production, followed by Italy (22%), Portugal (6%), and France (6%).

EU production has increased slightly in the last few years, especially since 2014 (+8% over the period 2014–2017), mainly driven by the upward trend seen in Italy (+31%) and Portugal (+10%).

#### Structure

The leading processing companies are vertically integrated, involved simultaneously in fishing, processing and sale; they have processing plants both in the EU and in third countries.

JEALSA-RIANXEIRA, Spanish-owned company, produced 125.000 tonnes of canned fish in 2018, including more than 100.000 tonnes of canned tuna, and has tuna canning plants in Spain (Galicia), Guatemala and Brazil. JEALSA-RIANXEIRA has two tuna fishing vessels which target tropical tunas in the East-Central and South-East Atlantic. JEALSA-RIANXEIRA exports 34% of its production outside of Spain and has a market share of 40% of the Spanish retail market.

CALVO is another Spanish-owned vertically integrated group. It is a leading company in Spain for canned fish and the second largest canned tuna brand in Italy. Also headquartered in Galicia, CALVO produced 110.000 tonnes of canned fish in 2018, mostly tuna, and has canning plants in Spain, El Salvador and Brazil. About 63% of the tuna processed by CALVO is supplied by CALVO's own fleet, which counts seven tuna purse seiners fishing in equatorial waters of the Eastern Pacific Ocean and in the Atlantic Ocean.

BOLTON FOODS, an Italy-based subsidiary of Dutch conglomerate BOLTON Group, owns some of Europe's biggest tuna brands, including SAUPIQUET, RIO MARE and PALMERA. Bolton, which is involved in tuna fishing through the fleet of its French subsidiary SAUPIQUET, also holds 40% of CALVO's capital since 2012. BOLTON has leading positions in the canned tuna market in Italy, France and Greece.

#### Supply to the industry

In the last 15 years, the EU canned tuna industry has imported more and more precooked frozen tuna loins and less frozen whole tunas. This partial switch has maintained the activity of many processing plants in the EU, which otherwise would have faced difficulties competing with factories located near the fishing areas.

<sup>86</sup> The EU fish market, 2018 edition (EUMOFA).

<sup>87</sup> European Tropical Tuna Fishing and Processing Committee (Eurothon).

In 2018, 77% of the tuna imported in the EU for canning purposes (in live equivalent weight) consisted of tuna loins compared to 72 % in 2015 and 65% in 2005.

Table 2. **EU IMPORTS OF TUNA FOR CANNING (volume in 1000 tonnes)**

Type of raw material	2015		2016		2017		2018	
	PW	LWE	PW	LWE	PW	LWE	PW	LWE
Fresh whole tunas	4.372	4.372	5.095	5.095	6.673	6.673	6.812	6.812
Frozen whole tunas	112.124	112.124	108.696	108.696	125.872	125.872	95.159	95.159
Frozen tuna loins	118.861	297.153	117.712	294.280	133.785	334.463	138.465	346.163
<b>Total</b>	<b>235.357</b>	<b>413.649</b>	<b>231.503</b>	<b>408.071</b>	<b>266.330</b>	<b>467.008</b>	<b>240.436</b>	<b>448.134</b>
%tuna loins/total		71,8%		72,1%		71,6%		77,2%

PW : product weight; LWE : live weight equivalent.

Source: EUROSTAT/COMEXT for PW data, EUMOFA elaboration for LWE data.

In 2018, the major suppliers of frozen whole tunas to the EU industry were Cape Verde (8.322 tonnes), Seychelles (8.158 tonnes), Philippines (7.021 tonnes), and Vietnam (3.552 tonnes) in addition to the two Member States, Spain (22.816 tonnes) and France (11.637 tonnes). The main suppliers of tuna loins were Ecuador (36.437 tonnes – in product weight), China (19.257 tonnes), Papua New Guinea (14.746 tonnes), Philippines (10.384 tonnes), Solomon Islands (8.106 tonnes), Mauritius (7.931 tonnes), and Indonesia (7.740 tonnes).

### 8.3 Export

The canned tuna exported by EU Member States goes mainly to other Member States (90% of total volumes exported in 2018). Africa absorbs 5,4% of the total (half of which by Ceuta and Melilla<sup>88</sup>).

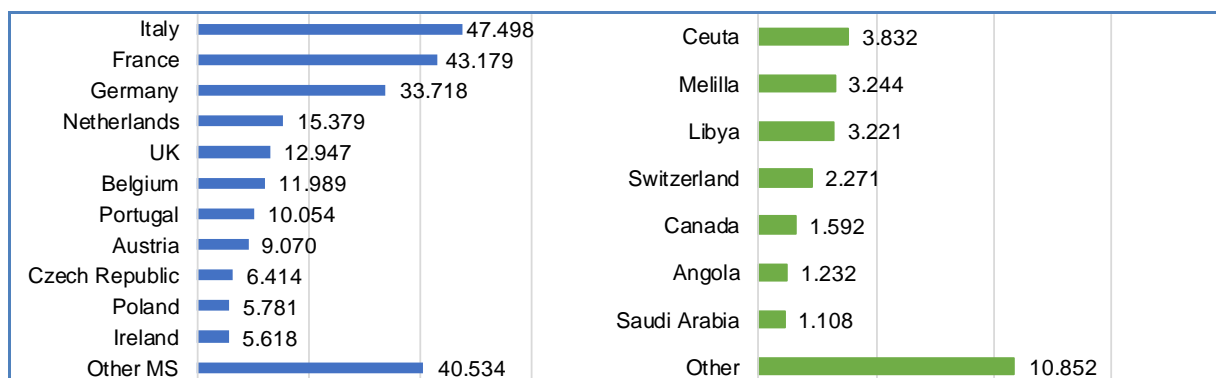
Table 3. **EU EXPORTS OF CANNED TUNA (volume in 1000 tonnes, value in million EUR)**

	2015		2016		2017		2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Intra-EU	188	828	194	911	226	1.114	242	1.223
Extra-EU	26	128	28	141	26	148	27	156
<b>Total</b>	<b>214</b>	<b>956</b>	<b>222</b>	<b>1.052</b>	<b>252</b>	<b>1.262</b>	<b>269</b>	<b>1.379</b>

Source: EUROSTAT/COMEXT.

The main destination markets within the EU are Italy, France and Germany, which together account for 51% by volume of EU's intra-EU exports. Extra-EU exports are limited. The main destinations are Ceuta and Melilla, Spain's enclaves in North Africa (26% of total extra-EU exported volume), followed by Libya (12%) and Switzerland (8%).

Figure 1. **DESTINATION COUNTRIES OF INTRA-EU EXPORTS (LEFT) AND EXTRA-EU EXPORTS (RIGHT) OF CANNED TUNA (volume in tonnes)**



Source: EUROSTAT/COMEXT.

<sup>88</sup> Ceuta and Melilla are not part of the customs territory of the Union (Regulation (EU) N°952/2013 – Article 4(1)).

## 8.4 Import

In 2018, EU imports of canned tuna were close to EUR 3 billion for 639.000 tonnes. About 38% of the volume originated in the EU Members States and 62% were imported from third countries.

Table 4. **EU IMPORTS OF CANNED TUNA (volume in 1000 tonnes, value in million EUR)**

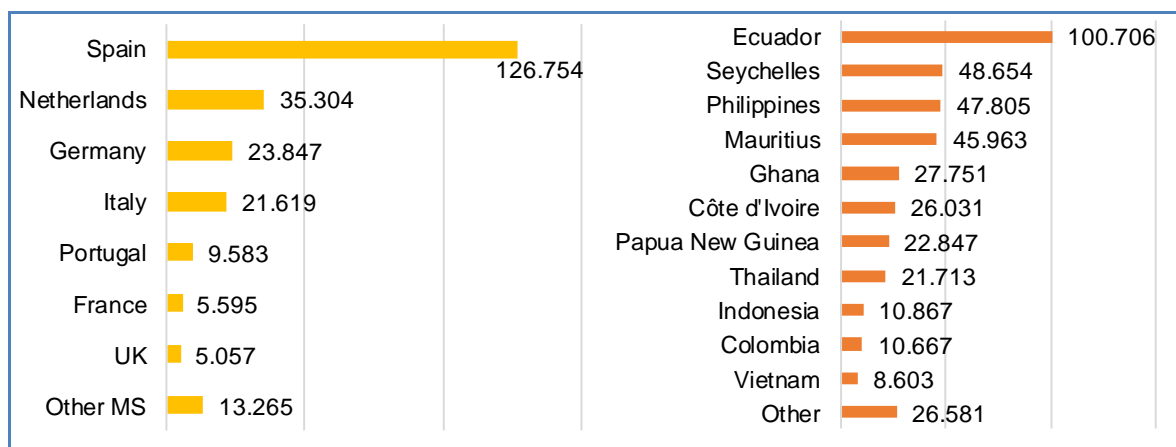
	2015		2016		2017		2018	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Intra-EU	199	936	201	962	222	1.116	241	1.273
Extra-EU	394	1.501	386	1.399	404	1.648	398	1.703
<b>Total</b>	<b>593</b>	<b>2.437</b>	<b>587</b>	<b>2.361</b>	<b>626</b>	<b>2.764</b>	<b>639</b>	<b>2.976</b>

Source: EUROSTAT/COMEXT.

Intra-EU imports are mostly covered by Spain, which provides 53% of the volumes of canned tuna of EU origin. Spain was followed by two non-producer Member States, the Netherlands and Germany, which have a significant trade activity and re-export important quantities of canned tuna (nearly 60.000 tonnes combined), covering one quarter of intra-EU imports.

The main extra-EU imports of canned tuna come from Ecuador, accounting for 25% of the total volume, followed by Seychelles, Philippines and Mauritius, which altogether supply 36% of extra-EU imports.

Figure 2. **COUNTRIES OF ORIGIN OF INTRA-EU IMPORTS (LEFT) AND EXTRA-EU IMPORTS (RIGHT) OF CANNED TUNA (volume in tonnes)**



Source: EUROSTAT/COMEXT.

## 8.5 Organisation of the sector

The interests of the EU canned tuna sector are represented by an interprofessional association, established in 2004, the European Tropical Tuna Fishing and Processing Committee, known as Eurothon.

This association brings together under one umbrella all tropical tuna European fleets and tuna processors.

Eurothon members include the three European Producer Organisations (Pos) involved in tropical tuna fishing<sup>89</sup> as well as the four national sector associations of the MS involved in tropical tuna canning<sup>90</sup>. They are active in Europe, Africa (ACP<sup>91</sup>-Africa) and Latin America. Their fishing activities take place in the Atlantic, Indian and Pacific Oceans.

The mission of Eurothon is "to support the sustainable development and understanding of the European tropical tuna sector in a complex world where international interactions are crucial"<sup>92</sup>.

Eurothon is not an interbranch organisation (IBO) in the meaning of the CMO regulation.

It should also be mentioned that standards governing the marketing of preserved tuna in the EU are defined in the Council Regulation (EEC) n°1536/92<sup>93</sup>.

<sup>89</sup> The French ORTHONGEL and the two Spanish ANABAC and OPAGAC.

<sup>90</sup> The Italian ANCIT, the Spanish ANFACO, the Portuguese ANICP and the French FIAC/ADEPALE.

<sup>91</sup> African, Caribbean and Pacific Group of States.

<sup>92</sup> <http://eurothon.eu/>

<sup>93</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31992R1536&from=EN>

## 8.6 Strategy of the EU canned tuna industry

In the last years, the tuna industry has experienced major developments, particularly in terms of sustainability, traceability, research-development and communication, which form the basis of the EU canned tuna industry's strategy.

According to the EU industry<sup>94</sup>, the strategic lines of the EU canned tuna sector in the coming years should be:

- R&D&I (research and development and innovation), which is a key tool for maximizing competitiveness and productive efficiency, guaranteeing food safety, traceability and sustainability throughout the supply chain, achieving the positioning of the canned category as a modern category, promoting business growth, and improving the range of products to align with new consumption habits and food trends;
  - The tuna sector should increase its competitiveness through innovation in both product innovation (working on health/wellness, sustainable/ethic, specialty food, and packaging) and process innovation;
- Sustainability, which includes both environmental sustainability (codes of good practices, policies of sustainability, sustainable sourcing) and social sustainability (human and labour rights, corporate social responsibility);
- Food safety and traceability, through scrupulous compliance with EU hygienic-sanitary and food security requirements as well as implementation of quality management systems and retailers' certifications such as BRC<sup>95</sup> and IFS<sup>96</sup> protocols;
- Internationalisation, which will continue to be a strategic pillar, both downstream (commercialisation of products) and upstream (assurance of raw materials);
- Communication and promotion, to improve the image of tuna and canned tuna, and build trust;
- Level playing field, which should be better guaranteed through effective monitoring and control mechanisms.

<sup>94</sup> The EU tuna industry and market, Juan M. Vieites (ANFACO), 15<sup>th</sup> Infotuna World Tuna Trade Conference, Bangkok, 29 May 2018.

<sup>95</sup> British Retail Consortium, [https://www.ifsqn.com/what\\_is\\_brc\\_certification\\_.html](https://www.ifsqn.com/what_is_brc_certification_.html)

<sup>96</sup> International Food Standard <https://www.ifs-certification.com/index.php/en/standards>

## 9 Fisheries and aquaculture of turbot

### 9.1 Introduction

Turbot (*Psetta maxima*) is a flatfish with an asymmetric and almost round body (eyes on the left side)<sup>97</sup>. With respect to habitat and biology, it is a benthic marine species, living on sandy and muddy bottoms, from shallow waters to 100 m. The turbot's spawning (sequenced, every 2-4 days) usually takes place between February and April in the Mediterranean, and between May and July in the Atlantic.

In the wild it is found in the Northeast Atlantic, throughout the Mediterranean and along the European coasts up to the Arctic Circle, as shown in figure 48<sup>98</sup>. It is also found in most of the Baltic Sea, and a subspecies (*Psetta maxima maetotica*) is found in the Black Sea<sup>99</sup>.

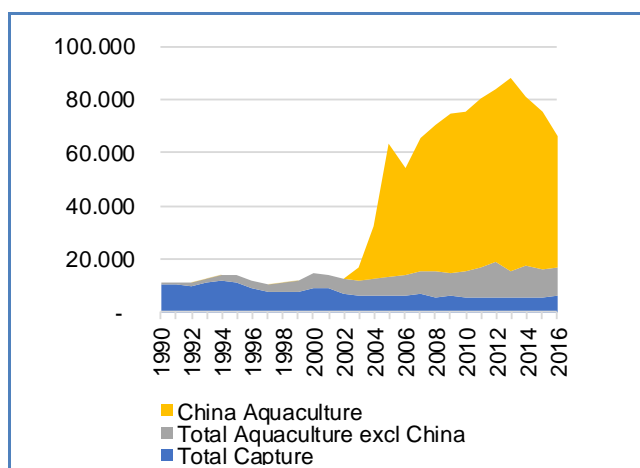
Aquaculture production of turbot started in the 1970s in Scotland (UK). It was subsequently introduced to France and Spain. Due to a scarcity of juveniles, the number of installations in Spain was initially limited. However, with technological development of juvenile production, Spain became the main producing country at the time.

Besides commercial investment in improved facilities and the construction of new farms, other decisive factors have assisted in the consolidation and development of the sector. These have included the production of dry feeds and the development of vaccines for the most important diseases affecting turbot.

### 9.2 Global aquaculture production

Source: Aquamaps

Figure 2. **GLOBAL CAPTURE AND AQUACULTURE PRODUCTION FROM 1990–2016 (volume in 1000 tonnes)**



Source: FAO.

From the early 1990s a reorganization of the sector began, which gave rise to growth both in production and in the number of countries where turbot is farmed. In the EU today turbot is farmed in Spain, Portugal, France, Romania and Croatia. Beyond the EU there is limited production in Norway and Iceland. Since 2000 the growth rate in European production has been on average 6% per year; however, after a peak in 2012 the growth has been flattening out.

Turbot was eventually introduced to other regions such as Chile and China. China started its production in the early 2000s based on European broodstock, and by 2013 production reached 73.000 tonnes. After 2013, production declined to about 50.000 tonnes in 2016. Still, China is by far the world's largest producer of turbot, the products do not compete in the same markets than the European products.

<sup>97</sup> [http://www.fao.org/fishery/culturedspecies/Psetta\\_maxima/en](http://www.fao.org/fishery/culturedspecies/Psetta_maxima/en)

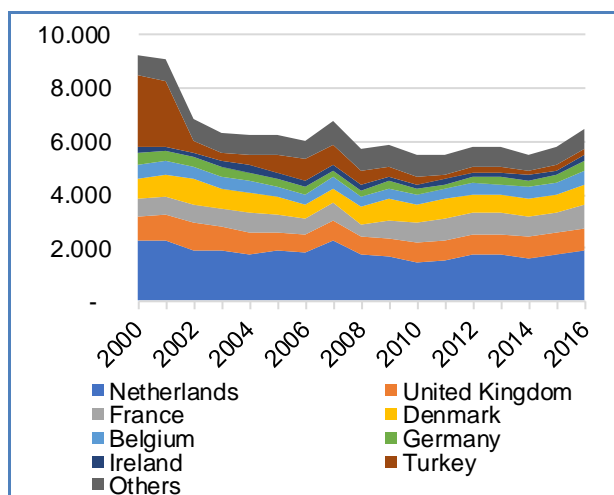
<sup>98</sup> [https://www.aquamaps.org/receive.php?type\\_of\\_map=regular](https://www.aquamaps.org/receive.php?type_of_map=regular)

<sup>99</sup> <https://www.fishbase.se/summary/Scophthalmus-maximus.html>

### 9.3 European catches

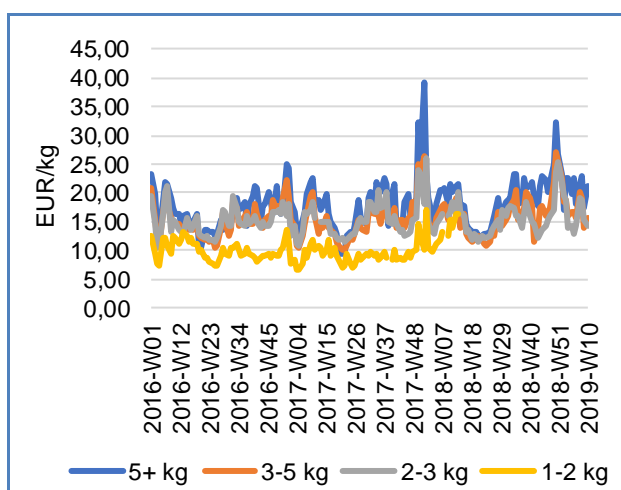
The European turbot captures have since 2000 declined from a total catch of 9.000 tonnes to volumes around 5-6.000 tonnes each year. The share of catch volumes between the countries have remained stable in recent years. The Netherlands has the largest volumes, with a catch of 1880 tonnes in 2016. The United Kingdom and France caught 873 and 846 tonnes of turbot respectively in 2016.

Figure 3. **EUROPEAN CATCHES OF TURBOT BY COUNTRY (volume in tonnes)**



Source: Eurostat.

Figure 4. **WEEKLY FIRST-SALES PRICE OF TURBOT PER SIZE (prices in EUR/kg)**



Source: EUMOFA.

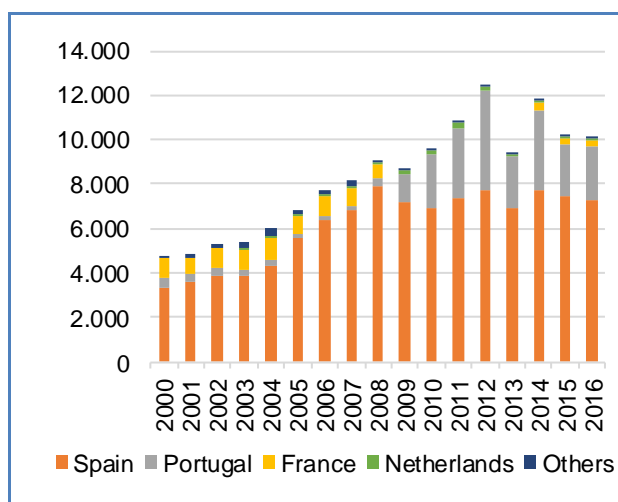
The chart shows the average first sales price of turbot by size for Belgium, Denmark, the Netherlands, Germany, Lithuania and Poland.

There is a slight upward first-sales price trend for turbot sold in the EU from 2016 up to February 2019. The structural price trend through the year shows peaks in prices during the Christmas festive season. The largest sized turbot achieves the highest prices in the market. Over the last two years, the price difference between turbot 5 kg or higher and turbot 3-5 kg has averaged around 2,00 EUR/kg.

## 9.4 Turbot aquaculture in the EU

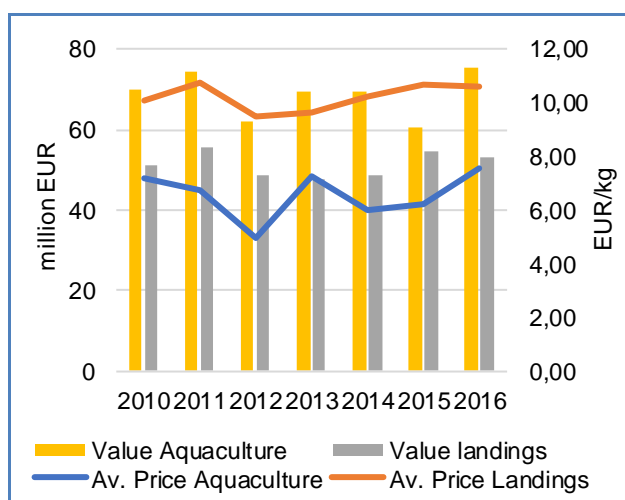
The major players in the EU turbot aquaculture sector are Spain, Portugal and France. Spain accounted for 72% of the value of EU production in 2016 and the production share is estimated at 76% in 2017<sup>100</sup>. Production has grown steadily since the beginning of the late 1980s and has recently stabilized at around 10.000 tonnes a year. Portugal has increased its production significantly since 2008 and produced 2.388 tonnes in 2016.

Figure 5. **TURBOT AQUACULTURE PRODUCTION IN THE EU BY MEMBER STATE (volume in tonnes)**



Source: EUMOFA/Eurostat/FAO.

Figure 6. **PRICE AND TOTAL VALUE OF TURBOT LANDINGS AND AQUACULTURE IN THE EU**



Source: EUMOFA/ Eurostat/FAO.

The turbot from marine fisheries achieves a higher price than farmed turbot. In the figure below, we see that the value from aquaculture is higher due to larger volumes, but that the average price per kg is significantly lower than for turbot landings. In the period 2010-2016, the price for farmed turbot has on average been 6,55 EUR/kg, 56% lower than turbot from marine fisheries (averaging at 10,21 EUR/kg).

It is estimated that production of turbot in Europe rose slightly to 11.000 tonnes in 2017 due to an increase in Spanish production. A slight reduction in production is expected in 2018<sup>101</sup>.

## 9.5 Trade

### Extra-EU Imports

Imports of turbot to the EU are small compared with domestic production in the EU. Over the last four years, imports have been stable at around 200 tonnes per year, this represents 1% of total catch and production in the EU.

Almost all turbot imports come from Norway and Morocco. The main source is Norway with 156 tonnes in 2017 and 139 tonnes in 2018; from Morocco 74 tonnes was imported in 2017 and 62 tonnes in 2018<sup>102</sup>.

The main importing Member States are Sweden, Spain, Germany and Denmark. While Germany, Denmark and Sweden import turbot from Norway, the main country of origin for Spain is Morocco.

<sup>100</sup> Apromar, La Acuicultura en España 2018.

<sup>101</sup> FEAP, APROMAR.

<sup>102</sup> Data for January–November 2018. Data for December 2018 was not available yet during the preparation of this case study.



Table 1. **EXTRA-EU IMPORTS OF WHOLE TURBOT BY PRESERVATION STATE**  
(volume in tonnes, price in EUR/kg)

Product	2015		2016		2017		2018 (Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
Fresh whole turbot	201	9,13	231	9,69	230	9,89	201	10,70
Frozen whole turbot	n/a	n/a	n/a	n/a	n/a	n/a	5	6,48

Source: EUMOFA/Eurostat.

Table 2. **EXTRA-EU IMPORTS OF FRESH WHOLE TURBOT BY MAIN IMPORTING MEMBER STATES (SWEDEN, DENMARK, GERMANY, SPAIN), (volume in tonnes, prices in EUR/kg)**

Importing Member State	2015		2016		2017		2018 (Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
Spain	60	11,08	72	12,31	74	12,95	62	14,00
Sweden	76	8,81	53	9,51	63	9,85	75	9,67
Germany	37	7,18	75	8,03	65	7,24	43	8,43
Denmark	26	8,36	31	8,00	29	8,09	21	9,27
Other	3	8,82	0		0,2	14,40	5	6,80
<b>Total</b>	<b>201</b>	<b>9,13</b>	<b>231</b>	<b>9,69</b>	<b>230</b>	<b>9,89</b>	<b>207</b>	<b>10,70</b>

Source: EUMOFA/Eurostat.

### Extra-EU Exports

Of the total catch and production of turbot in the EU of approximately 16.000 tonnes in 2016, only around 400 tonnes were exported to countries outside the EU, of which approximately 75% was fresh product.

The US is the largest export market for fresh whole turbot from the EU. In 2018<sup>103</sup>, EU exports of turbot to the US amounted to 119 tonnes.

Table 3. **EXTRA-EU EXPORTS OF WHOLE TURBOT BY PRESERVATION STATE (volume in tonnes, price in EUR/kg)**

Product	2015		2016		2017		2018 (provisional Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
Fresh whole turbot	328	12,25	327	13,85	372	12,77	312	16,73
Frozen whole turbot	106	9,28	69	11,12	68	12,63	83	10,39

Source: EUMOFA/Eurostat.

Table 4. **EXTRA-EU EXPORTS OF FRESH WHOLE TURBOT BY MAIN DESTINATION (volume in tonnes, price in EUR/kg)**

Destination country	2015		2016		2017		2018 (provisional Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
United States	110	9,52	100	10,15	106	10,45	119	10,61
Switzerland	75	17,16	72	16,48	69	15,62	58	15,77
Turkey	56	4,52	66	3,55	84	3,51	24	3,45
Canada	20	25,77	28	25,39	23	25,67	31	25,99
Montenegro	14	8,00	16	11,06	16	9,07	13	11,50
United Arab Emirates	7	14,45	7	12,58	10	16,38	9	15,95
Other	46	15,11	38	29,22	65	21,15	57	32,49
<b>Total</b>	<b>328</b>	<b>12,25</b>	<b>327</b>	<b>13,85</b>	<b>373</b>	<b>12,77</b>	<b>311</b>	<b>16,73</b>

Source: EUMOFA/Eurostat.

<sup>103</sup> Data for January–November 2018. Data for December 2018 was not available yet during the preparation of this case study.

Table 5. **EXTRA-EU EXPORTS OF FROZEN WHOLE TURBOT BY MAIN DESTINATION (volume in tonnes, prices in EUR/kg)**

Destination country	2015		2016		2017		2018 (provisional Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
United Arab Emirates	40	18,67	35	15,03	28	16,33	22	14,57
Viet Nam	44	2,06	<0,5	n/a	0,4	29,38	0,5	40,76
Dominican Republic	4	6,12	9	5,45	7	7,32	11	7,06
Turkey	0,1	14,40	3	6,92	5	4,70	6	4,00
Canada	0		0,7	5,03	6	6,23	7	5,00
Mexico	3	6,70	3	9,25	6	10,80	3	8,73
Other	15	6,60	18	7,73	15	14,07	33	10,79
<b>Total</b>	<b>106</b>	<b>9,28</b>	<b>68</b>	<b>11,12</b>	<b>68</b>	<b>12,63</b>	<b>83</b>	<b>10,39</b>

Source: EUMOFA/Eurostat.

### Intra-EU Exports

While trade of turbot between EU and third countries is very limited, trade between Member States (especially those of fresh products) is considerably greater. Exports from Spain, Portugal and the Netherlands account for most of the intra-EU trade of turbot. Portuguese production is financed by Spanish investment capital and is almost entirely exported to Spain<sup>104</sup>.

Italy and France mainly import turbot from Spain and the Netherlands. The Netherlands imports mainly from Belgium and Germany. Germany imports mainly from Spain, the Netherlands and France.

Table 6. **INTRA-EU EXPORTS OF WHOLE TURBOT BY PRESERVATION STATE (volume in tonnes, price in EUR/kg)**

Product	2015		2016		2017		2018 (provisional Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
Fresh whole turbot	11 850	7.70	10 030	9.60	11 297	9.11	9 641	10.30
Frozen whole turbot	1 206	4.30	637	5.94	542	6.54	613	6.69

Source: EUMOFA/Eurostat.

Table 7. **INTRA-EU EXPORTS OF FRESH WHOLE TURBOT, BY MAIN IMPORTING MEMBER STATES (volume in tonnes, price in EUR/kg)**

Importing Member State	2015		2016		2017		2018 (provisional Jan–Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
Spain	3 347	6,91	2.571	9,07	3.322	8,43	3.117	9,65
Italy	3 018	7,41	2.667	8,97	3.053	8,44	2.458	9,62
France	1 951	7,28	1.477	9,63	1.680	8,68	1.071	10,48
Netherlands	923	8,19	923	8,42	773	8,84	805	8,80
Germany	677	11,74	793	12,11	742	11,99	600	12,80
Portugal	213	8,07	206	10,11	460	9,55	534	10,58
Other	1 722	8,35	1.393	11,00	1.266	11,43	1.056	13,22
<b>Total</b>	<b>11.850</b>	<b>7,70</b>	<b>10.030</b>	<b>9,60</b>	<b>11.296</b>	<b>9,11</b>	<b>9.641</b>	<b>10,30</b>

Source: EUMOFA/Eurostat.

<sup>104</sup> EUMOFA – “Price structure in the supply chain for turbot”, <http://www.eumofa.eu/market-analysis>

Table 8. **INTRA-EU EXPORTS OF FROZEN WHOLE TURBOT BY MAIN EXPORTING MEMBER STATES (volume in tonnes, prices in EUR/kg)**

Exporting Member State	2015		2016		2017		2018 (provisional Jan-Nov)	
	Volume	Price	Volume	Price	Volume	Price	Volume	Price
Spain	565	2,73	279	4,24	183	4,21	269	4,85
Italy	239	4,72	125	6,77	109	6,13	108	7,09
Germany	58	6,80	57	4,34	66	7,03	80	7,67
France	132	4,48	69	6,56	49	6,64	36	6,46
UK	0	6,95	0	-	0	11,20	26	5,98
Portugal	55	4,03	4	5,99	10	5,44	21	9,10
Other	51	7,28	35	10,14	57	7,85	40	8,41
<b>Total</b>	<b>1.101</b>	<b>3,82</b>	<b>568</b>	<b>5,31</b>	<b>474</b>	<b>5,67</b>	<b>580</b>	<b>6,10</b>

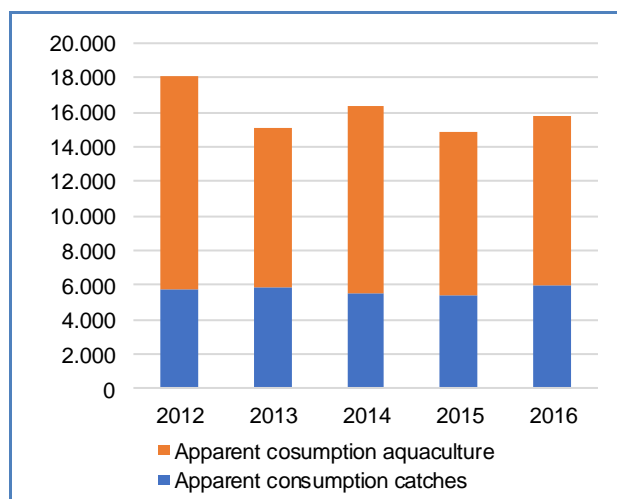
Source: EUMOFA/Eurostat.

## 9.6 Consumption

In 2016, 15.750 tonnes of turbot were consumed in the EU, mainly fresh. Consumption is concentrated in Spain, France and Italy, which represent about 75% of the EU market. This makes turbot a niche market compared with other major species<sup>105</sup>.

EU apparent consumption of turbot has been relatively stable for both wild and farmed products, although consumption of farmed fish has been slightly more variable than wild fish. However, apparent consumption per capita is estimated to be stable, with approximately 10 grams per capita for captured turbot and double that for farmed turbot (20 grams per capita).

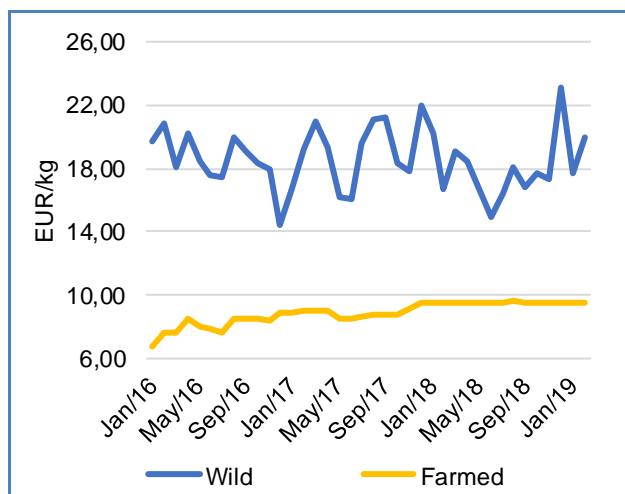
Figure 7. **APPARENT CONSUMPTION OF TURBOT IN THE EU (volume in tonnes)**



Source: EUMOFA – Supply balance.

<sup>105</sup> EUMOFA – “Price structure in the supply chain for turbot”, <http://www.eumofa.eu/market-analysis>

Figure 8. **WHOLESALE PRICE TREND OF FRESH TURBOT IN SPAIN**



Source: Mercabarna wholesale market.

In Spain, household consumption of turbot rose by 7,7% in terms of volume and by 12% in terms of value from 2016 to 2017. In nominal terms, household consumption is estimated at 4.200 tonnes in 2017, for a value of EUR 44 million<sup>106</sup>. Because Spain is the leading producer of turbot, the country exports a significant share to other Member States, mainly France, Italy and Germany. The market preference is towards fresh product and turbot is sold mainly in whole form, but it can also be sold as fillets to consumers<sup>107</sup>.

In France and the Netherlands, turbot is mainly consumed out of home and consumption is supplied to a large extent on fishery-produced fish<sup>108</sup>. In Spain, consumption is mainly based on farmed turbot due to the large national production. A large share of the turbot sales goes to the HoReCa segment and to a lesser extent to fishmongers/small retailers. Like other seafood, an increasing share of turbot is sold by large scale retailers<sup>109</sup>. Over the last 4-year period, annual volumes of turbot sold at the wholesale markets in Spain have been stable at around 2.000 tonnes. The main wholesale markets where turbot is sold are Mercabarna and Mercamadrid, where farmed turbot constitute close to 80% of the sales in volume terms<sup>110</sup>.

As with prices at the first-sales level, prices at the wholesale level are higher for wild turbot than farmed turbot. The price difference is mainly due to limited availability of wild turbot. While a slight increasing trend is observed for farmed fresh turbot wholesale price in Spain, a clear trend cannot be observed for wild turbot. In 2017 and 2018, wholesale prices peaked during the Christmas festive season.

<sup>106</sup> Mapama – panel data.

<sup>107</sup> [http://www.fao.org/fishery/culturedspecies/Psetta\\_maxima/en](http://www.fao.org/fishery/culturedspecies/Psetta_maxima/en)

<sup>108</sup> EUMOFA – “Price structure in the supply chain for turbot”, <http://www.eumofa.eu/market-analysis>

<sup>109</sup> Mapama – panel data.

<sup>110</sup> Mercabarna and Mercamadrid wholesale markets.

## 10 First sales of whiting in major places of sale

With almost 30.000 tonnes landed in 2017, whiting<sup>111</sup> is the sixth of the largest main commercial species within the groundfish commodity group<sup>112</sup>.

### 10.1 EU whiting fisheries and markets

Whiting is distributed throughout the Northeast Atlantic, from the northern coast of Portugal to Iceland and the south-western Barents Sea. The two main catching areas for this species are the North Sea/Eastern Channel and the Celtic Sea. Whiting can also be found in the western Mediterranean Sea, Black Sea, Aegean Sea and the Adriatic Sea.

Table 1. **LANDINGS OF WHITING IN THE EU IN 2017  
(volume in tonnes)**

Member States	Volume (tonnes)
United Kingdom	9.768
France	9.618
Ireland	5.738
The Netherlands	1.253
Italy	919
Denmark	697
Poland	371
Germany	336
Croatia	122
Other	371
<b>Total</b>	<b>29.193</b>

Source: EUMOFA.

In terms of first sales of whiting, Peterhead in the United Kingdom and Boulogne-sur-Mer in France are two key locations, followed by other British (Lerwick, Fraserburgh, Scalloway) and French (Roscoff, Cherbourg, Saint-Quay-Portrieux) ports. First on the list of landing ports for whiting after the UK and France is the Dutch port of IJmuiden. The three locations selected for this analysis are thus Peterhead, Boulogne-sur-Mer and IJmuiden.

The EU accounted for 77% of the global production of whiting in 2017, the other producing countries being Turkey, Norway and Iceland. In the EU, three Member states (the United Kingdom, France and Ireland) were responsible for 86% of whiting catches<sup>113</sup>.

The EU, particularly the UK and France, is the most significant market for whiting in the world.

As a species, whiting is of secondary commercial importance compared to, for example, cod or hake. Since the late 1970s, EU commercial landings have gradually declined: falling from a record volume of 272.000 tonnes in 1976 to 30-35.0000 tonnes in the 2010s. Whiting is caught in mixed trawl fisheries, along with cod and haddock and it is also caught in Norway lobster fisheries, especially in France. In 2018, the EU TAC for whiting was 46.720 tonnes, out of which 17.754 tonnes was allocated to France, 16.355 tonnes to the United Kingdom, 6.268 tonnes to Ireland, 2.841 tonnes to Denmark, and 1.216 tonnes to the Netherlands, the remaining 2.276 tonnes being allocated to Spain, Belgium, Germany, and Sweden.

Table 2. **MAJOR FIRST-SALE PLACES<sup>114</sup> FOR WHITING  
IN THE EU IN 2017 (volume in tonnes)**

Member States/Port	Volume (tonnes)
UK - Peterhead	3.498
FR - Boulogne-sur-Mer	3.130
UK -Lerwick	996
FR - Roscoff	880
FR - Cherbourg	863
FR - Saint-Quay-Portrieux	845
FR - Le Guilvinec	721
FR - Erquy	712
UK - Fraserburgh	624
UK - Scalloway	454
FR - Les Sables-d'Olonne	303
FR - Port-en-Bessin	287
NL - IJmuiden	273
UK - Cullivoe	267

Source: EUMOFA.

<sup>111</sup> Whiting (*Merlangius merlangus*) should not be confused with blue whiting (*Micromesistius poutassou*), mostly used for oil production or surimi.

<sup>112</sup> <https://www.eumofa.eu/en/web/eumofa/ad-hoc-queries3>

<sup>113</sup> FAO Fishstat.

<sup>114</sup> Significant first sale places also exist in Ireland for whiting, e.g. Dunmore East (1.664 tonnes in 2016) and Castletownbere (1.585 tonnes in 2016), but detailed data are not available in EUMOFA database.

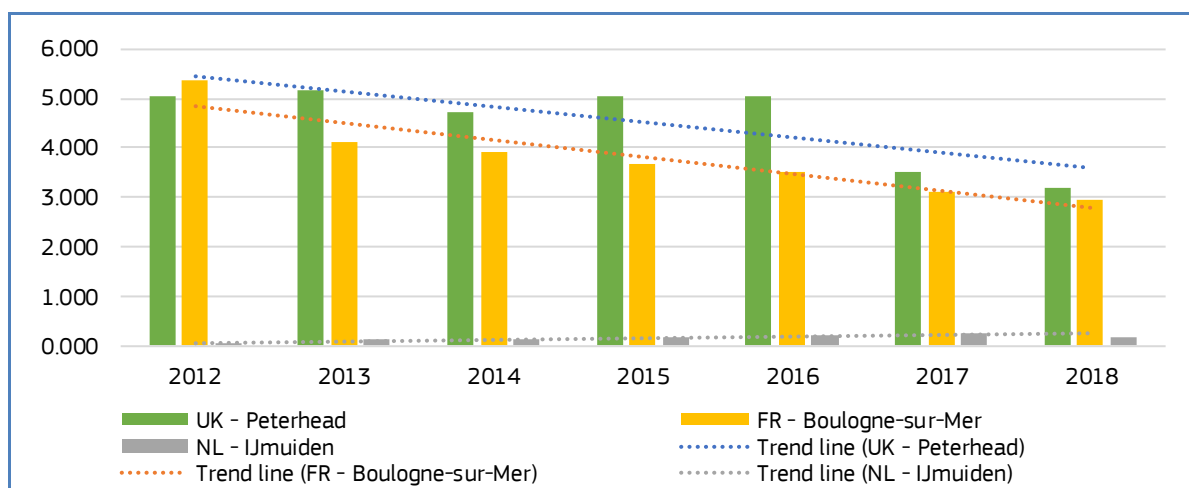
## 10.2 First sales of whiting in Peterhead, Boulogne-sur-Mer and IJmuiden

- **Peterhead** is by far the largest auction in the UK both in terms of value and volume, with a turnover of EUR 148 million for 108.150 tonnes of fish sold in 2018. It is based on the northeast coast of Scotland. In 2018, whiting was the 7<sup>th</sup> most significant species for this market, both in value and volume, after mackerel, cod, haddock, monk, herring and saithe (in descending order of value)<sup>115</sup>.
- **Boulogne-sur-Mer** located on the northern part of the Channel, is home to the largest auction in terms of volume, in France. The Boulogne-sur-Mer auction is the 3<sup>rd</sup> most significant auction in terms of value in France, with a turnover of EUR 49 million for 21.000 tonnes of fish sold in 2018. In 2018, whiting was the 2<sup>nd</sup> largest species in volume (after saithe) and the 5<sup>th</sup> most important in terms of value, after squid, saithe, mackerel and scallop<sup>116</sup>.
- **IJmuiden** is located at the mouth of the North Sea Canal, which connects Amsterdam to the North Sea, and is by far the largest Dutch auction both in terms of value and volume with a turnover of EUR 276 million for 235.000 tonnes of fish sold in 2018. IJmuiden is primarily a blue whiting and small pelagics port. In 2018, whiting ranked 15<sup>th</sup> in volume and 23<sup>rd</sup> in value, in terms of species sold<sup>117</sup>.

The highest first-sale volume of whiting is recorded in Peterhead with almost 3.500 tonnes in 2017, followed by Boulogne with 3.130 tonnes in the same year.

In 2018, Peterhead was responsible for 42% of all first sales of whiting in the United Kingdom in volume, while Boulogne accounted for 40% of all first sales of whiting in France. IJmuiden's share of the Dutch first-sales of whiting was 34%.

Figure 1. **FIRST SALES OF WHITING IN THE THREE SELECTED PLACES (volume in tonnes)**



Sources: EUMOFA.

First sales of whiting have experienced a similar downward trend in both Peterhead and Boulogne-sur-Mer between 2012 and 2018. By contrast, sales in IJmuiden grew significantly but still remain at a sales level far below that of the two other ports.

<sup>115</sup> EUMOFA.

<sup>116</sup> EUMOFA.

<sup>117</sup> EUMOFA.

### 10.3 Analysis by presentation state and size

In all three markets, whiting is most commonly sold as a whole fish – this presentation state accounts for 68% of total first sales of whiting in Peterhead, 86% in Boulogne-sur-Mer, and 54% in IJmuiden.

Table 3. **FIRST SALES OF WHITING BY PRESENTATION STATE IN THE THREE KEY LOCATIONS IN 2018**

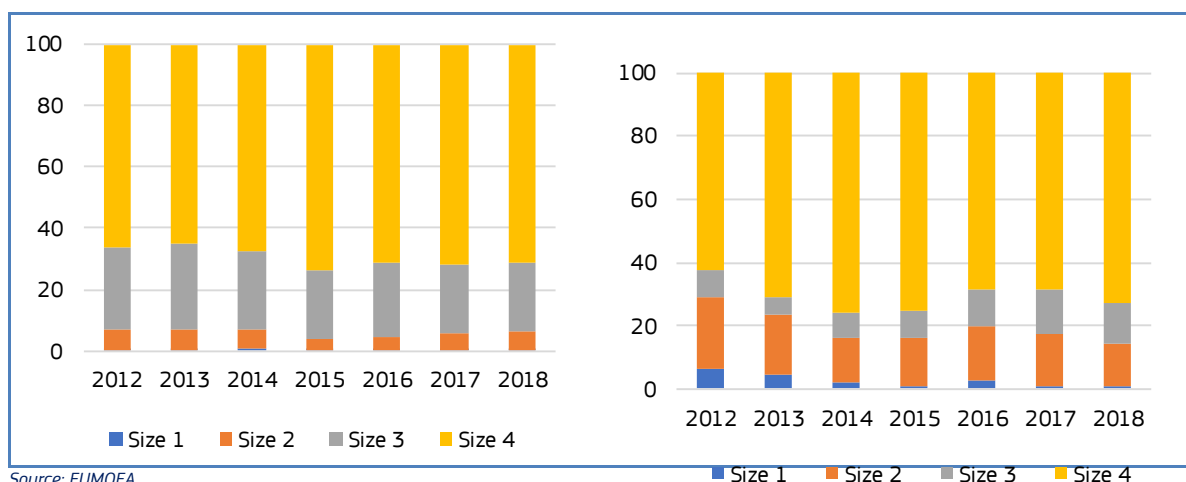
Place of sale	Presentation states	Volume (tonnes)	Value (1000 EUR)	% volume	% value
FR - Boulogne	Whole	2.752	3.175	92,6	85,9
	Gutted	216	501	7,3	13,5
	Roe	4	22	0,1	0,6
NL - IJmuiden	Whole	108	102	61,1	54,2
	Gutted	68	83	38,3	44,0
	Roe	1	4	0,5	1,9
UK - Peterhead	Whole	2.283	3.329	71,8	67,6
	Gutted	895	1.598	28,2	32,4
	Roe	0	0	0,0	0,0

Source: EUMOFA.

Marketing of whiting in the European Union is regulated by marketing standards that establish size and freshness grades<sup>118</sup>. Specifically, marketing standards for fresh whiting establish the following four size grades used by European Union auctions recording their sales' statistics:

- Size grade 1: 0,500 kg and over;
- Size grade 2: 350 to 500 g;
- Size grade 3: 250 to 350 g;
- Size grade 4: 110 to 250 g.

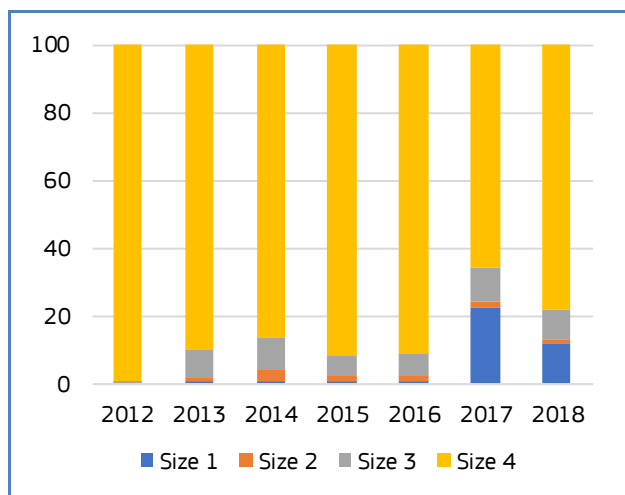
Figure 2. **BREAKDOWN OF FIRST SALES OF WHITING BY SIZE IN BOULOGNE (LEFT) AND PETERHEAD (RIGHT)**



Source: EUMOFA.

<sup>118</sup> Council Regulation (EC) No 2406/96 of 26 November 1996 laying down common marketing standards for certain fishery products.

Figure 3. **BREAKDOWN OF FIRST SALES OF WHITING BY SIZE IN IJMUIDEN**



Source: EUMOFA.

Data show that sales of whiting are dominated by small-sizes fish. In 2018, sizes 3 and 4 (less than 350 g) represent 94% of sales in Boulogne, 86% in Peterhead and 87% in IJmuiden.

Larger sizes available (1 and 2) show a decreasing trend in Peterhead, falling (as a percentage of first sales) from 28,8% in 2012 to 14,3% in 2018. The proportion of larger fish on the market in Boulogne is relatively stable, but smaller in comparison (6,8% in 2012, to 6,1% in 2018). The opposite trend is seen in IJmuiden, where sales of large-sized fish were almost non-existent at the beginning of the period (0,4% in 2012), before experiencing a significant increase in 2017-2018. Volumes of sizes 1 and 2 remain at a low level in absolute terms (66 tonnes in 2017 and 23 tonnes in 2018), as the overall sales of whiting are 17-18 times smaller in IJmuiden than in Peterhead or Boulogne (2018 volume data)<sup>119</sup>.

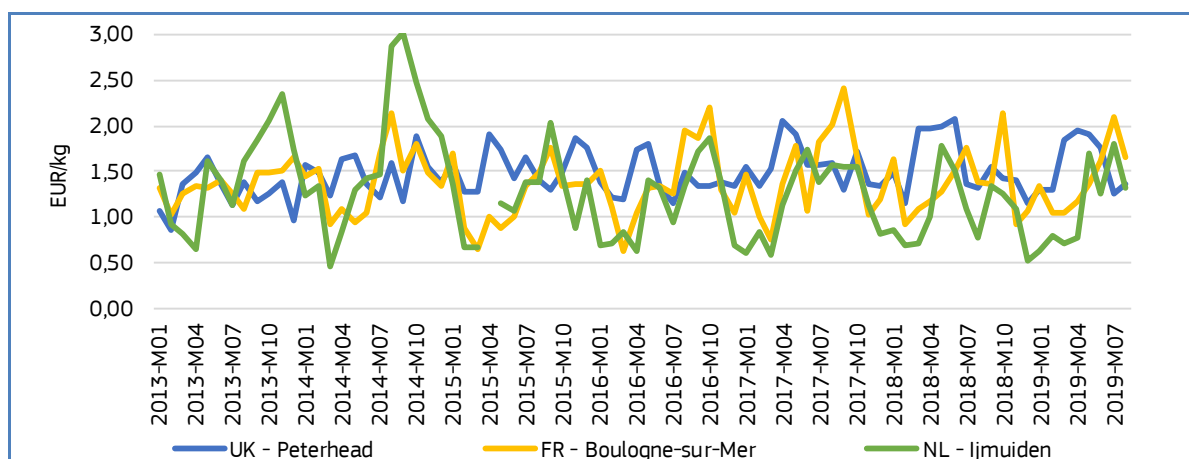
The significance of this prevalence of smaller fish can be linked to the state of the stock in the Celtic Sea, where the fishery is characterised by large catches of small whiting. Since 2012, selective gears (square-meshed panels<sup>120</sup>, which facilitate the escapement of small undersized fish) have been rigged on trawlers fishing in the Celtic Sea, however, the selectivity rate has not improved significantly<sup>121</sup>.

## 10.4 Price trends

### ➤ General price trends

The figure below shows the evolution of first sale prices in the three selected locations from January 2013 to August 2019 (most recent data available for the three ports). Significant differences appear between the three auctions.

Figure 4. **MONTHLY FIRST-SALES PRICES IN THE THREE SELECTED AUCTIONS**



Source: EUMOFA.

The average price across the 80-month period is significantly higher in Peterhead (1,46 EUR/kg), compared to Boulogne (1,24 EUR/kg) and IJmuiden (1,27 EUR/kg). This is clearly related to the proportion of gutted fish for sale, which is demonstrably higher in Peterhead (28% of all whiting volumes in 2018, compared to 7% in Boulogne), and to the proportion of large-sized fish which is also higher in Peterhead (sizes 1 and 2 represent 14% of all whiting volumes in 2018, compared to 6% in Boulogne).

We can also observe that prices follow a slightly increasing trend in Peterhead and Boulogne while they are on a downward trend in IJmuiden.

The amplitude of variation in prices is the most significant for IJmuiden, where average monthly sales are very low (15 tonnes over the period 2013-2019), compared to Boulogne (290 tonnes) and Peterhead (369 tonnes). Extremely low levels in IJmuiden (less

<sup>119</sup> EUMOFA.

<sup>120</sup> <https://www.seafish.org/gear/devices/profile/square-mesh-panels>

<sup>121</sup> <http://www.guidedesespeces.org/fr/merlan>

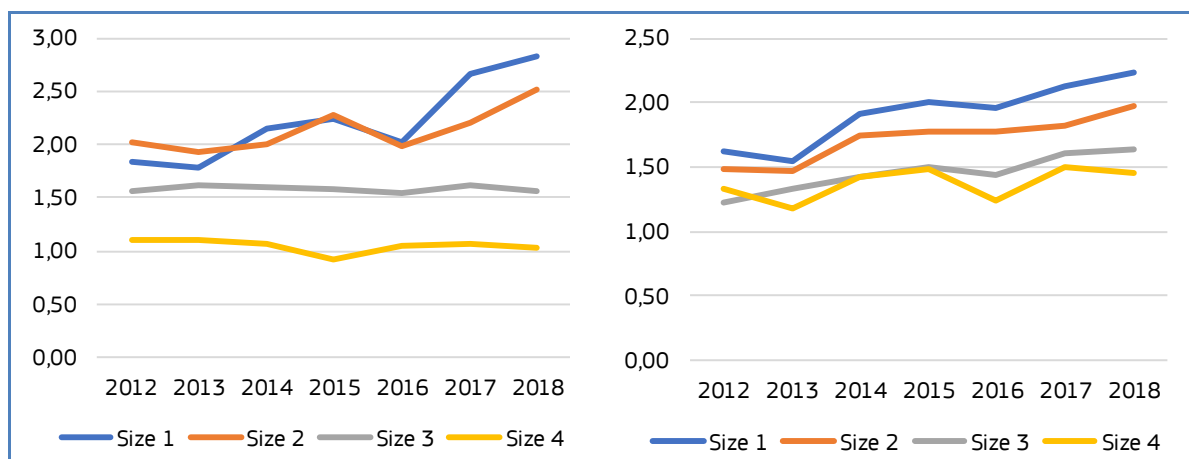


than 5 tonnes/month) can generate a greater degree of price variation (e.g. 3,02 EUR/kg for 4,6 tonnes sold in September 2014 compared to 0,46 EUR/kg for 2,8 tonnes sold in March 2014). Unlike in the other two ports, whiting is not a core species in IJmuiden and has no dedicated traders, which makes it less sensitive to supply and demand.

The amplitude in variation of prices is bigger in Boulogne, where prices are often at their lowest in the month of March. This is linked to the fact that March is the month which, year on year, records the highest landings of whiting. In addition, in March there are high levels of first sales of saithe, dab and sole. This abundance of whiting on the market in March and competition from high landings of other species lead to low whiting prices at this period.

➤ **Trends by size**

Figure 5. **FIRST-SALES PRICES OF WHITING BY SIZE GRADE IN 2012-2018 IN BOULOGNE (LEFT) AND PETERHEAD (RIGHT)**



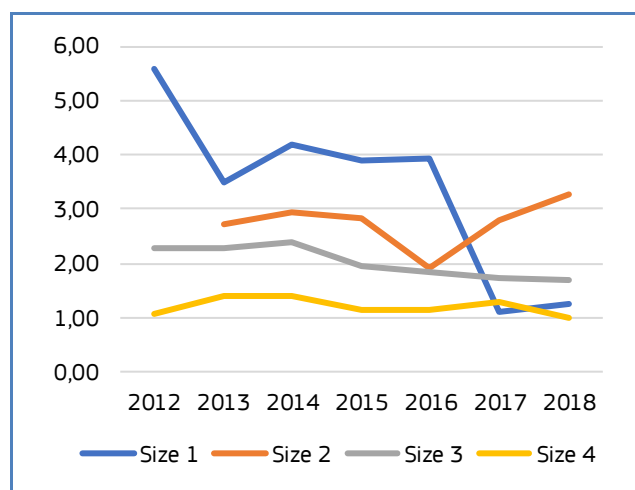
Source: EUMOFA.

Boulogne and IJmuiden show a clear differentiation between sales value of sizes 3 and 4 (in Boulogne, size 3 is paid 50% more than size 4). However, in Peterhead the price premium for size 3, which was non-existent until 2015, is limited to just a 10% increase in comparison to size 4 in the years 2016-2018.

The strong decrease of size 1 in IJmuiden in 2017-2018 is related to the evolution of volumes.

From 2012 to 2016 the landings of size 1 were almost non-existent in IJmuiden (81 kg for the whole year 2012, 623 kg in 2013, 805 kg in 2014, 1.100 kg in 2015, 1.013 kg in 2016), size 1 representing less than 1% of total whiting's first sales for all these years. In 2017 and 2018, the first sales were much higher (61.147 kg and 20.438 kg respectively), representing 22% and 2% of whiting's total sales respectively.

Figure 6. **FIRST-SALES PRICES OF WHITING BY SIZE GRADE IN 2012-2018 IN IJMUIDEN**



Source: EUMOFA.

Table 4. **WHITING: EVOLUTION OF FIRST-SALES PRICES BY SIZE IN BOULOGNE AND PETERHEAD IN 2012-2018**

Size category	Boulogne	Peterhead
1	+53%	+37%
2	+24%	+32%
3	+1%	+33%
4	-8%	+9%

Source: EUMOFA.

It is also interesting to note that in Boulogne-sur-mer the price evolution within the 2012-2018 period is directly related to size: the bigger the size, the stronger the price increase. Large sizes are indeed easier to value in fillets and more adapted to today's conduct of companies.

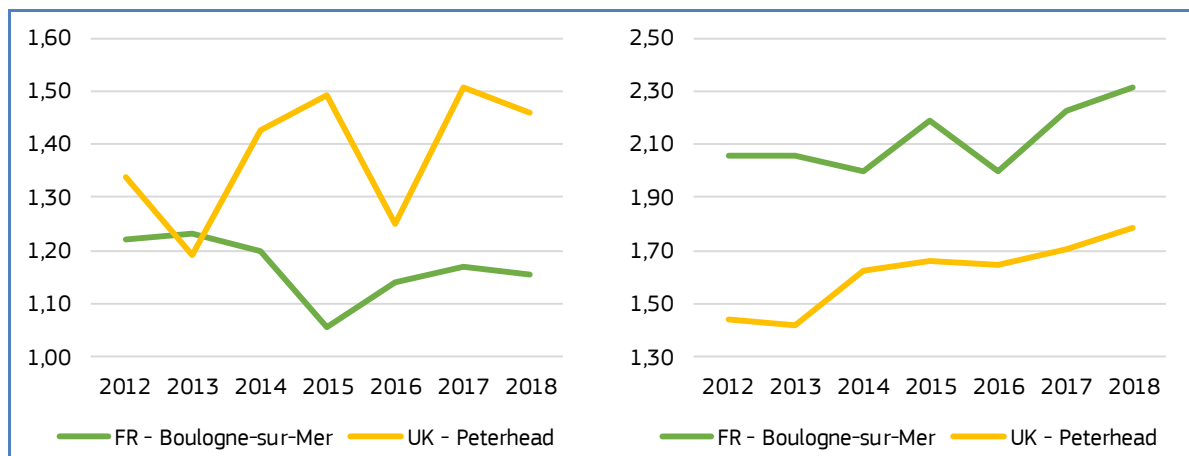
In Peterhead, the price evolution is about the same for the three largest sizes and significantly lower for the smallest size.

➤ **Trends by presentation state**

The price trajectory for gutted whiting is more stable than for whole fish. It shows a gradual, relatively linear increase.

The difference between whole and gutted fish is much more marked in Boulogne, where gutted fish is paid 81% more, on average, than whole (2,12 EUR/kg vs. 1,17 EUR/kg) across the period. In Peterhead, where sales of gutted fish are more common, the difference in price between gutted and whole fish is much less pronounced (1,61 EUR/kg vs. 1,38 EUR/kg; i.e. +17%).

Figure 7. **FIRST-SALES PRICES BY PRESENTATION STATE, WHOLE (LEFT) AND GUTTED (RIGHT), IN BOULOGNE-SUR-MER AND PETERHEAD IN 2012-2018**



Source: EUMOFA

➤ **Fishing gear**

There is a price premium for line-caught fish over trawled fish, especially in France, where line-caught whiting receives a much better price than trawled whiting. In Paris-Rungis wholesale market in September 2019 (average monthly prices), the following prices could be observed<sup>122</sup>:

- trawled whiting, whole, 200-300 g: 3,50 EUR/kg
- trawled whiting, whole, 300-500 g: 6,00 EUR/kg
- line-caught whiting, whole, 300-500 g: 7,50 EUR/kg.

<sup>122</sup> FranceAgriMer/Réseau des Nouvelles des Marchés.

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