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# MONTHLY HIGHLIGHTS

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In January–November 2016, first-sales value of cod decreased in Belgium, Denmark, France, Latvia, Lithuania, and Sweden. By contrast, they increased in Norway and the UK. In November 2016, herring landings volume increased in Denmark, Estonia, and Sweden. They exhibited the opposite trend in Lithuania, Latvia, Norway, and the UK. Sole first-sales price increased in Belgium, France, Italy, and Portugal, and decreased significantly in Denmark.

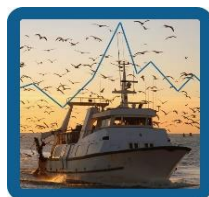
In Italy in January–November 2016, first-sales value reached EUR 289,25 million, a 1% decrease from January–November 2015. Volume also decreased 5%, mainly because of anchovy and sardine. Squid experienced increases in both first-sales value (+6%) and volume (+4%), as well as in the average price, which reached 8 EUR/kg. At the same time, deep-water rose shrimp first-sales value (–10%) and price (–13%) decreased.

In December 2016, the total catch of Icelandic vessels increased 20% in volume, compared with December 2015. This was caused mainly by blue whiting (+115%) and herring (+52%).

Landings by Malta's fleet in 2015 were dominated by swordfish and bluefin tuna, which accounted for 26% and 16% of first-sales value, respectively. Currently, six aquaculture farms operate on Malta from nine sites in designated aquaculture zones. Tuna (capture-based species) and seabream, seabass, and meagre (closed-cycle species) are predominant in the Maltese aquaculture.

EU production of algae has focused traditionally on seaweed harvesting for the extraction of hydrocolloid for industrial purposes. But EU macroalgae production is limited, and the competition with third countries has become significant. However, the demand for edible algae is increasing in EU markets, and new production models and new market stream are emerging.

Retail prices of fresh monk for household consumption increased in Spain and decreased in France (January–October 2016). In Spain prices were highest in winter, particularly in November and December when the average price reached 12,08 EUR/kg. In France retail prices are on average 53% higher than in Spain.



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# 1. First sales in Europe

In **January–November 2016**, ten EU Member States and Norway reported first-sales data for 11 commodity groups.<sup>1</sup> First-sales value increased over the previous year (January–November 2015) for Denmark, Norway, Portugal, and the UK.

In **Belgium** in **January–November 2016**, first sales decreased in both value and volume from January–November 2015. Sole (–15%), cod (–49%) and ray (–14%) were the main causes of the decrease in value. By contrast, common shrimp experienced higher first-sales value (+124%), due to increased catches combined with a significant price increase (+44%). Prices of cuttlefish (+26%), common shrimp (+44%), cod (+15%) and ray (+13%) also increased substantially. In **November 2016**, first sales decreased in both value and volume from November 2015. This was mainly caused by cod, plaice, and sole. However, average prices were higher: cod (+8%), plaice (+3%), and sole (+1%).

In **Denmark** in **January–November 2016**, first-sales value increased while volume decreased, compared with January–November 2015. Lower volume of common shrimp caused a spike of the average price (+152%). Increased prices of plaice (+12%), herring (+26%), and hake (+7%) contributed to the overall increase in value. Higher volume of Norway lobster, plaice, sole, monk, and mackerel did not offset the overall decrease attributable to mussel (–23%), cod (–13%), saithe (–21%), and mackerel (–24%). In **November 2016**, the increase in both first-sales value and volume over November 2015 was mainly caused by mackerel and herring. Among the main species landed, average prices increased remarkably for mackerel (+37%), and fell sharply for sole (–47%).

In **January–November 2016**, **Estonia** saw decreases in both first-sales value and volume from the same period a year before. Herring and sprat, which accounted for most of first-sales value (71%) and volume (95%), were the cause of the decrease. The price of herring and pike-perch decreased 5% and 12%, respectively, while the price of European perch experienced an opposite trend (+12%). In **November 2016**, herring first-sales value increased 36%, but did not offset the overall decrease, caused by sprat (–22%). The volume increase over November 2015 was also caused by herring (+51%).

In **France** in **January–November 2016**, first-sales volume registered a moderate decrease from January–November 2015. Cuttlefish, squid, anchovy, cod, and red mullet were the main species experiencing smaller landings. In **November 2016**, first sales increased in value, but decreased in volume. Among the top ten species landed, prices increased for scallop (+24%), cuttlefish (+46%), squid and sole (both +4%), and red mullet (+114%). The sharp increase of red mullet price was due to lower first-sales volume (–53%). Prices decreased for monk (–9%), hake and whiting (both –5%), and Norway lobster and European seabass (both –2%).

In **Italy** in **January–November 2016**, first sales decreased in both value and volume from the same period in 2015. Sardine, anchovy, red mullet, and hake were the main species contributing to the decrease. In

**November 2016**, the negative trend was maintained in value and especially in volume, compared with November 2015. See more in Section 1.1.

**Latvia** experienced decreases in both first-sales value and volume in **January–November 2016**, compared with January–November 2015. This was caused mainly by sprat (–20% in value and –9% in volume) which accounted for approximately half of the first-sales volume. First-sales value of cod (–29%) also contributed to the overall decrease. In **November 2016**, the decrease in first-sales value was the result of herring and sprat (–22% and –13%, respectively) compared with November 2015. Volume and price of herring decreased 14% and 10%, respectively.

In **Lithuania** in **January–November 2016**, first sales decreased slightly in value (due to cod and herring) and increased in volume over the same period the previous year, mainly because of larger volume of European flounder. Prices decreased significantly for herring (–18%), but increased for European flounder (+6%) and cod (+1%). In **November 2016**, lower values of cod (–25%) and herring (–95%) as well as lower volumes (–29% and –94%, respectively) contributed to the overall decrease from November 2015.

In **Norway** in **January–November 2016**, first-sales value increased, mainly because of higher first-sales prices of cod, mackerel, and herring. Volume moved in the opposite direction, due to blue whiting (–32%) and saithe and mackerel (both –18%). In **November 2016**, the remarkable decline in both value and volume was caused by cod, herring, and mackerel, as well as haddock, and pouting. Higher first-sales prices of haddock (+4%), herring (+8%), and mackerel (+33%) did not affect the overall decrease in value.

In **Portugal** in **January–November 2016** first sales increased in value and decreased in volume, compared with the same period in 2015. Value increased mostly because of cuttlefish (+32%) and anchovy (+156%), and to a lesser extent because of Norway lobster, European seabass, sole, clam, and ray. The sharp increase of anchovy first-sales value was attributable to higher first-sales volume (+180%). Octopus and horse mackerel also experienced higher volume. However, this did not offset the overall decrease, due mostly to mackerel which accounted for a quarter of Portuguese first-sales volume. In **November 2016**, octopus (+58%) was the main contributor to the increase in first-sales value, whereas mackerel first-sales volume was 34% lower. Among the top ten species, prices increased for octopus (+11%), mackerel (+25%), scabbardfish (+4%), sole (+19%), swordfish (+8%) gilthead seabream (+8%), and clam (+16%). They decreased for horse mackerel (–24%), tropical shrimp (–14%), and squid (–8%).

In **January–November 2016** in **Spain** (31 ports), landings of fresh fish (201.756 tonnes) increased 2% over January–November 2015, but decreased 7% from January–November 2014. In **November 2016**, 19.466 tonnes of fresh fish were landed (+10% and –5% compared with November 2015 and 2014, respectively).<sup>2</sup> Of these, 8.874 tonnes were landed in the port of Vigo (+22% over November 2015). The increase

was caused mainly by chub mackerel, horse mackerel, and bogue.<sup>3</sup>

In **Sweden**, the decrease in value in **January–November 2016**, from the same period in 2015, was caused by cod and sprat (–15% and –14%, respectively). Mostly herring (–18%), but also cod and sprat, contributed to the decrease in volume. In **November 2016**, first-sales value of herring (+58%) contributed to the overall increase in value over November 2015, whereas sprat (–38%) was the main reason for the decrease in volume. Price increases were greatest for herring (+56%) and sprat (+11%). Norway lobster and northern prawn experienced significant decreases (–14% and –25%, respectively).

In the **UK** in **January–November 2016**, higher first-sales value of mackerel (+22%), herring (+81%), monk (+33%), and Norway lobster (+12%) contributed to the overall increase in value. In **November 2016**, first-sales value increase was also caused by mackerel (+26%), as well as hake (+87%), monk (+36%) and scallop (+11%). Lower landings of herring, mackerel and whiting, were offset by increased volume of hake, haddock, and monk. Average prices increased for scallop, cuttlefish, and mackerel (+6%, +62%, and +36%, respectively). They decreased significantly for haddock (–24%), Norway lobster (–13%), and crab, cod, and hake (all –12%).

Table 1. **JANUARY–NOVEMBER FIRST-SALES OVERVIEW OF THE REPORTING COUNTRIES** (volume in tonnes and value in million EUR)

Country	January–November 2014		January–November 2015		January–November 2016		Change from January–November 2015	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
<b>Belgium</b>	17.455	61,13	16.333	61,03	14.574	57,56	–11%	–6%
<b>Denmark</b>	242.452	268,86	259.312	304,98	247.594	347,56	–5%	14%
<b>Estonia</b>	49.793	12,82	49.598	11,69	44.072	10,90	–11%	–7%
<b>France</b>	191.862	569,43	183.110	599,24	177.612	598,62	–3%	0%
<b>Italy*</b>	78.483	276,57	82.406	290,98	78.428	289,25	–5%	–1%
<b>Latvia</b>	49.752	13,98	51.135	12,50	47.537	10,10	–7%	–19%
<b>Lithuania</b>	1.620	1,10	1.802	1,37	1.921	1,37	7%	0%
<b>Norway</b>	2.588.985	1.907,23	2.611.952	2.028,85	2.345.731	2.077,27	–10%	2%
<b>Portugal</b>	87.048	159,90	110.177	173,93	97.949	181,30	–11%	4%
<b>Sweden</b>	136.441	80,24	145.928	87,40	99.317	79,84	–32%	–9%
<b>United Kingdom</b>	455.468	691,18	393.371	679,70	417.928	750,72	6%	10%

Table 2. **NOVEMBER FIRST-SALES OVERVIEW OF THE REPORTING COUNTRIES** (volume in tonnes and value in million EUR)

Country	November 2014		November 2015		November 2016		Change from November 2015	
	Volume	Value	Volume	Value	Volume	Value	Volume	Value
<b>Belgium</b>	2.041	6,93	1.790	6,32	1.182	5,04	–34%	–20%
<b>Denmark</b>	25.634	31,11	30.382	34,11	37.902	44,91	25%	32%
<b>Estonia</b>	6.094	1,48	6.135	1,47	6.629	1,45	8%	–1%
<b>France</b>	15.877	52,29	17.353	56,39	16.177	56,73	–7%	1%
<b>Italy*</b>	7.130	21,60	8.523	26,62	7.287	25,52	–15%	–4%
<b>Latvia</b>	6.459	1,77	6.377	1,45	5.689	1,18	–11%	–19%
<b>Lithuania</b>	377	0,26	168	0,11	132	0,08	–22%	–24%
<b>Norway</b>	265.644	245,33	235.443	225,04	179.346	187,56	–24%	–17%
<b>Portugal</b>	4.975	10,58	11.159	14,49	8.675	14,74	–22%	2%
<b>Sweden</b>	9.866	6,27	7.965	5,60	7.327	6,01	–8%	7%
<b>United Kingdom</b>	42.846	67,12	49.349	77,44	53.022	93,16	7%	20%

Source: EUMOFA (updated 13.01.2017); volume data is reported in net weight.

\*Partial data. First-sales data for Italy covers 259 ports (approximately 50% of the total landings).



## 1.1. ITALY

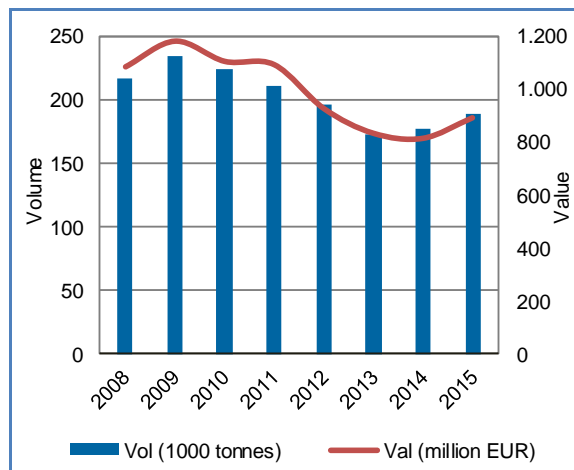
Italy has a coastline of 9.136 km, accounting for approximately 9% of the total EU coastline. The surface of the coastal regions represents 60% of the national territory. Although fisheries contribute less than 0,3% to the country's GDP, it is an important economic sector, especially for certain regions in the south (e.g. Sicily and Apulia).

The Italian fishing fleet is highly diversified with a broad range of vessel types targeting different species predominantly in the Mediterranean (i.e. the Adriatic and southern Tyrrhenian seas). The fleet has declined continuously since 2008, 7% in number and 17% in tonnage. It consists of 12.316 vessels (December 2015), with a gross tonnage of 151.585 GT. The largest segment is made up of small-scale fishing vessels (approximately two-thirds). These are vessels shorter than 12 m and typically less than 2 GT on average. The small-scale fleet typically uses passive gears such as longlines, set-nets, pots, and traps.

The main Italian ports for landings are Mazara del Vallo, Trapani, Palermo, Chioggia, Ancona, Molfetta, and Manfredonia.<sup>4</sup>

Most of the Italian catches result from fishing in the Mediterranean. Overall, the Italian fisheries witnessed a declining trend in landings (in both volume and value), except in 2015, when the trend was reversed. In 2015, Italian vessels landed 188.752 tonnes of fish and seafood, with a value of EUR 889,93 million. Landings increased in both value and volume (+10% and +7%, respectively) over 2014. The average price of landings increased 3% reaching 4,71 EUR/kg.

Figure 1. LANDINGS IN ITALY



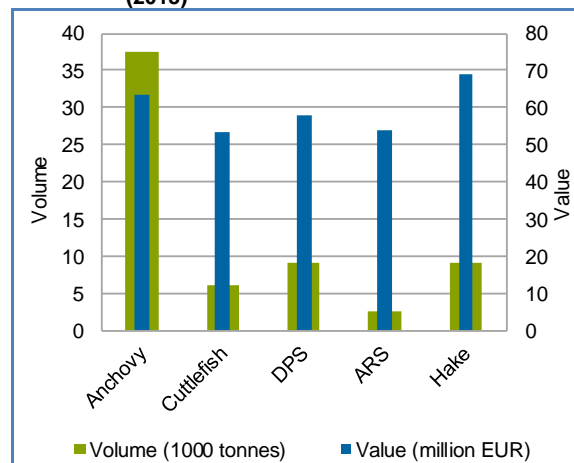
Source: ITAFISHSTAT (updated 13.01.2017).

One of the most important activities is the deep-water crustacean fishery, which takes place in a large area of the Mediterranean, from the Channel of Sardinia (between Sardinia and Africa) to the Aegean Sea and farther east to the Levant Sea. The target species are deep-water rose shrimp and giant red shrimp. Hake is the most relevant bycatch species.

In 2015, the top five species in value landed in Italy were anchovy, cuttlefish, deep-water rose shrimp (DPS), giant red shrimp (ARS), and hake. They accounted for 33% in

value and 34% in volume of all species landed. Other significant species were swordfish (EUR 39,43 million) red mullet (EUR 31,79 million) and clam (EUR 31,48 million).

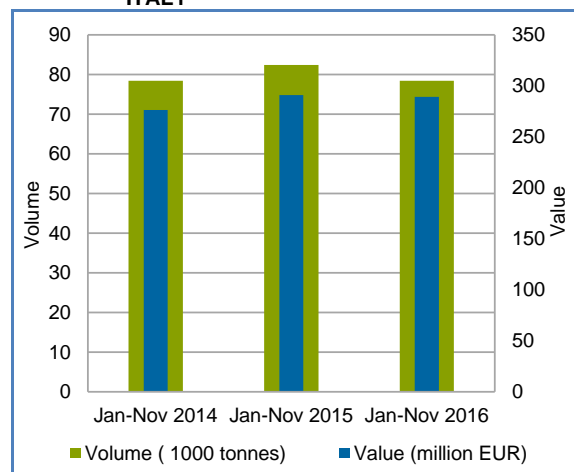
Figure 2. LANDINGS IN ITALY BY MAIN SPECIES (2015)



Source: ITAFISHSTAT (updated 13.01.2017).

In January–November 2016, first-sales value (of 259 ports) reached EUR 289,25 million, (–1% from the corresponding period the previous year); volume also decreased 5%. Higher first-sales values of clam (+43%) and swordfish and miscellaneous shrimps (both +9%) did not offset the overall decrease in value caused mainly by anchovy (–5%), tropical shrimp (i.e. deep-water rose shrimp) and hake (both –7%), and red mullet (–11%). In volume, first sales decreased 5%, ending at 78.428 tonnes. This was mainly the result of anchovy and sardine (–10% and –12%, respectively).

Figure 3. JANUARY–NOVEMBER FIRST SALES IN ITALY



Source: EUMOFA (updated 13.01.2017).

In November 2016, both first-sales value (–4%) and volume (–15%) decreased, from November 2015. This was mainly the result of albacore tuna (EUR 0,06 million, –82%), tropical shrimp (EUR 3,26 million, –10%), and anchovy (EUR 2,60 million, –10%). The increase in the average price of clam<sup>5</sup> (+54%), hake and cuttlefish (both +28%), and sole (+11%) did not prevent the decrease in value. Volume fell mainly because of anchovy (–26%), sardine (–16%), and albacore tuna (–84%).

### 1.1.1. SQUID



Squid is distributed in the waters of the Northeast Atlantic, the English Channel, the North Sea, and the Mediterranean. In Italy, the European squid is the most commonly caught and it is found in the Adriatic Sea

and around Sicily. Squid has a round, cylindrically body, with two elongated side fins joining the rest of the body in a diamond shape, which often represent a key element to distinguish it from similar species.

The species lives in large groups at depths of 40–150 m, but also in deeper areas, down to 500 m. In late autumn, it migrates from coastal areas to the deeper offshore waters, where water temperature is more stable. Groups move both horizontally and vertically, coordinated in the water.

Squid is an active predator, feeding mainly during the day. The species is attracted by light; therefore, it can also be fished during the night in brightly lit areas. Squid feeds on small fish, crustaceans, molluscs, sea worms, and other squid. In turn, it is an important prey for marine mammals (dolphins) and large pelagic species, such as tuna and swordfish.

In the Mediterranean, the male can reach 50 cm (mantle length), while the female does not exceed 30 cm; the most common size is around 15–25 cm.

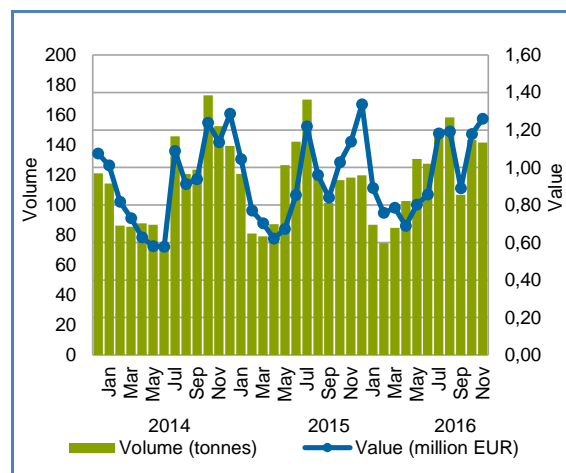
The species is not threatened and is not subject to catch quotas. Squid is fished year-round, with bottom trawls (mainly as bycatch), as well as with artisanal gears, such as gillnets.<sup>6</sup>

The main landing ports the species are Ancona, Chioggia, Civitanova Marche, and Manfredonia on the Adriatic Sea. On the market, squid is sold both fresh and frozen, whole or cut into rings.

Fishing is seasonal, with lower catches in late winter and early spring (February–March) when the species is less abundant, due to breeding.

In January–November 2016, first-sales value of squid was EUR 10,48 million and 1.308 tonnes. This was an increase in both value (+6%) and volume (+4%) over January–November 2015. Compared with January–November 2014, first-sales value and volume increased 9% and 5%, respectively.

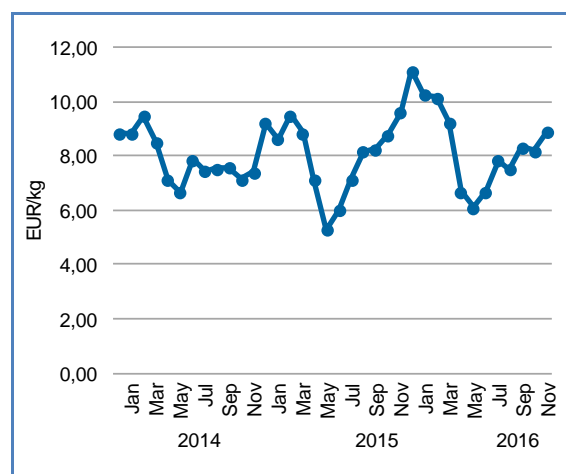
Figure 4. **SQUID: FIRST SALES IN ITALY**



Source: EUMOFA (updated 13.01.2017).

The average unit price of squid has fluctuated over the years. In January–November 2016, the average unit price was EUR 8,00/kg, 3% and 4% higher than the corresponding period in 2015 and 2014, respectively. The highest average price in the past three years was in December 2015, at 11,16 EUR/kg, corresponding to 120 tonnes.

Figure 5. **SQUID: FIRST-SALES PRICE IN ITALY**



Source: EUMOFA (updated 13.01.2017).

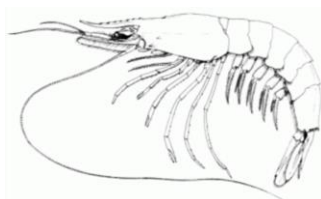
We have covered **Squid** in previous *Monthly Highlights*:

First sales: The United Kingdom (10/2015, 1/2014), France (1/2015)

Trade: Intra-EU exports (5/2016), Extra-EU imports (9/2015)

Consumption: Italy, Portugal, the United Kingdom (5/2014)

### 1.1.2. DEEP-WATER ROSE SHRIMP



The deep-water rose shrimp (*Parapenaeus longirostris*) is found in muddy sand substrata at depths of 150–400 m. It is distributed in the eastern Atlantic: from Spain to Angola, in the western Atlantic from the USA (Massachusetts) to Guiana, as well as in the entire Mediterranean Sea.<sup>7</sup>

The species feeds on small fish, cephalopods, and crustaceans. It reaches maturity after one year and can live for up to 3–4 years. Typically, it is 10–14 cm long. It has high nutritional value and protein content and is highly prized on the market.<sup>8</sup>

The deep-water rose shrimp fishery takes place in many areas in the Mediterranean Sea, but most of the catch comes from the Strait of Sicily. The species is a typical straddling stock, where most adult specimens live in international waters, while juveniles are found in the national waters.<sup>9</sup>

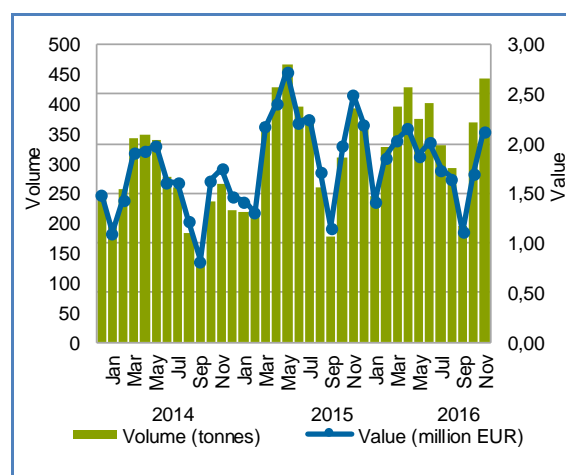
The deep-water rose shrimp is caught with bottom trawls, 12–24 m length, which operate along the southern coast of Sicily. Trawlers over 24 m fish offshore, in both Italian and international waters of the Central Mediterranean.<sup>10</sup>

The deep-water rose shrimp stock is overexploited in the Strait of Sicily. A General Fisheries Commission for the Mediterranean (GFCM) recommendation for the implementation of a multiannual management plan for fisheries targeting deep-water rose shrimp and European hake was adopted to ensure the conservation of the species.<sup>11</sup>

Fishing is seasonal, with peaks in winter (November–December) and spring (April–May) when the species is more abundant. The minimum landing size for the species is 20 mm (carapace length).<sup>12</sup>

The accumulated first-sales value of deep-water rose shrimp in January–November 2016 reached EUR 19,71 million, a 10% decrease from the corresponding period in 2015. The volume in the same months increased 6% to 3.802 tonnes. Compared with January–November 2014, the first-sales value and volume increased 16% and 34%, respectively.

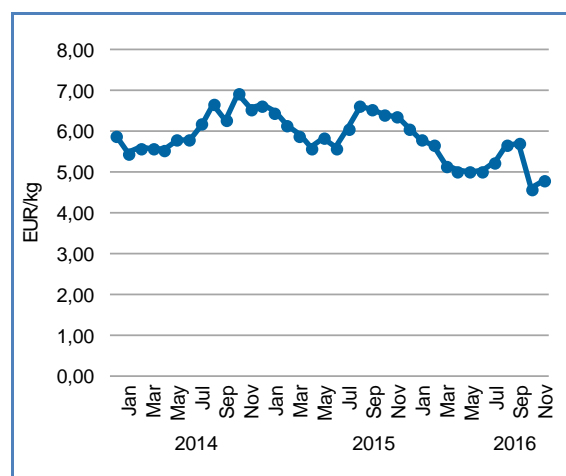
Figure 6. DEEP-WATER ROSE SHRIMP: FIRST SALES IN ITALY



Source: EUMOFA (updated 13.01.2017).

The average unit price in January–November 2016 was 5,18 EUR/kg, 15% and 13% decreases from January–November 2015 and January–November 2014, respectively. The highest price was registered in October 2014, at 6,93 EUR/kg, corresponding to 235 tonnes.

Figure 7. DEEP-WATER ROSE SHRIMP: FIRST-SALES PRICE IN ITALY



Source: EUMOFA (updated 13.01.2017).

## 2. Global Supply

**Resources / France / Fish auctions:** With 26.882 tonnes landed for a first-sales value of EUR 86 million, the port of Lorient remained France's leading fishing port in 2016. Lorient increased both volume (+1,4%) and value (+2,4%) over 2015. The main species landed were hake (6.400 tonnes), ling (3.300 tonnes), monk (2.800 tonnes), saithe (1.900 tonnes), scabbardfish (1.800 tonnes), and Norway lobster (1.000 tonnes). The good results recorded in 2016 resulted mainly from the performance of the deep-sea fishery (12.600 tonnes, +5%), whereas coastal fisheries decreased 6% to 5.800 tonnes. In addition, the port imported 5.200 tonnes of fish from British, Icelandic, and Spanish vessels.<sup>13</sup>

**Resources / Faroe Islands:** The Faroe Islands has concluded individual fishery agreements with Norway, Greenland, and the EU. The agreement with Norway increases the Faroese cod quota in Norwegian waters and the Norwegian mackerel quota in Faroese waters. A similar agreement has been reached for haddock, pollack, and other species. Norway has been granted quotas in Faroese waters for mackerel, ling, blue whiting, and other species. The agreement with Greenland allows Faroese fishing vessels to take more cod and halibut in Greenland waters. Greenlandic vessels in Faroese waters have access to blue whiting. The agreement with the EU is similar to that from 2015. The EU and the Faroe Islands have agreed to mutual access to fish mackerel and herring. Faroese ships can take blue whiting in EU waters.<sup>14</sup>

**Fisheries / Iceland:** The total catch of Icelandic vessels was 59.482 tonnes in December 2016, 20% more than in December 2015. The increase was caused mainly by blue whiting (18.852 tonnes, +115%) and herring (13.2013 tonnes, +52%). By contrast, cod landings decreased 20%, ending at 15.908 tonnes. On a year-to-year basis (January 2015–December 2016), the total catch decreased 19%, owing mostly to capelin (–71%) and blue whiting (–13%).<sup>15</sup>

**Fisheries / Japan / Tuna:** In 2015, landed quantities of tuna decreased 3% to 356.500 tonnes. Of this volume, 29% were landed fresh (103.200 tonnes, +6%) and 71% were landed frozen (253.300 tonnes, –6%). The main species landed fresh are skipjack (53.000 tonnes), albacore (35.000 tonnes), and yellowfin tuna (7.000 tonnes). The main species landed frozen are skipjack (182.000 tonnes), yellowfin (32.000 tonnes), and bigeye tuna (25.000 tonnes). Average first-sales prices of fresh tuna range from 2,70 EUR/kg for skipjack to 7,37 EUR/kg for yellowfin, 11,27 EUR/kg for bigeye tuna, and 14,15 EUR/kg for bluefin tuna. First-sales prices of frozen tuna ranged from 1,44 for skipjack to 2,88 EUR/kg for yellowfin, 6,98 EUR/kg for bigeye tuna, and 13,24 EUR/kg for bluefin tuna. In October 2016, the first-sales price of fresh bluefin tuna was 19,17 EUR/kg, 3% below the October 2015 price, while the first-sales price of frozen skipjack was 1,93 EUR/kg, 8% above the October 2015 price.<sup>16</sup>

**Fisheries / Australia:** Australia's fisheries and aquaculture industry is a minor global player, producing less than 0,15% of global fisheries and aquaculture supply. However, the industry exports a range of high-value fisheries and aquaculture products, with an estimated 52% of production value exported in 2014/2015. Australia is a leading supplier of southern bluefin tuna to Japan, and abalone and live lobster to Hong Kong and China. In 2014/2015, Australian fisheries and aquaculture production increased 6% in volume to 235.700 tonnes, 64% supplied by wild catch (–1%) and 36% by aquaculture (+19%). The main wild-caught species in value were rock lobster, prawns, abalone, tuna, sharks, and Australian sardine. Key aquaculture species were salmonids, tuna, oyster, prawns, and barramundi.<sup>17</sup>

**Resources / Morocco:** Moroccan landings increased in both volume (+7%) and value (+4%) in 2016, mostly thanks to an increase in sardine and mackerel landings. Pelagic species represent 89% of all landings in volume and 41% in value. In 2016, top species were sardine (912.000 tonnes) and mackerel (206.000 tonnes). Despite a decreasing volume of 24.000 tonnes (–26%), octopus remained the second-largest species in value (20% of the total) after sardine (26%). Mediterranean ports accounted for only a small part of total landings (less than 2% in volume and 6% in value). The main pelagic ports were Dakhla (590.000 tonnes), Laayoune (368.000 tonnes), and Tan Tan (82.000 tonnes). The three ports also led in white fish, while Casablanca, Agadir, and Essaouira were at the top of the list for crustacean landings.<sup>18</sup>

**Certification / Production / Portugal:** A Portuguese company specialising in the production of canned seafood has achieved Friend of the Sea (FoS) certification for skipjack and yellowfin tuna. The raw material comes from a certified supplier. The fish is caught with purse-seiners in the Western Central Pacific Ocean.<sup>19</sup>

**Trade / EU / Vietnam:** Vietnam's shrimp exports to the EU in November 2016 reached USD 50,5 million (EUR 47,5 million), up 14% over the same period in 2015. The EU was Vietnam's second largest market, after the US, accounting for 19% of total exported shrimp. The UK, the Netherlands, and Germany remain the main EU markets. Shrimp exports to the UK and the Netherlands increased 4,3% and 34,7% respectively, while exports to Germany fell 3,2% from November 2015.<sup>20</sup>

**Trade / Norway:** In 2016, Norwegian seafood exports reached NOK 91,6 billion (EUR 10,08 billion), a 23% increase over 2015. Of these, NOK 61,3 billion (EUR 6,75 billion) went to the EU, 23% more than in 2015. Poland (NOK 9,7 billion, EUR 1,07 billion) was Norway's main export destination, followed by France (NOK 7,9 billion, EUR 0,87 billion). Salmon exports were worth NOK 61,4 billion (EUR 6,8), and they increased 29% in value from 2015. However, volume was 5,2% less, the result of higher export prices. In 2016, the average price of fresh whole salmon (the main product exported) was 60,11 NOK/kg (6,6 EUR/kg) 40% more than in 2015.<sup>21</sup>

## 3. Case studies

### 3.1. FISHERIES IN MALTA

Malta plays an important role in European fisheries and aquaculture sector, especially concerning bluefin tuna farming. The country accounts for a significant share of EU exports of bluefin tuna to the Japanese sushi and sashimi market. Most Maltese tuna exports originate in other EU Member States. They are imported live and are transferred to pens for fattening. A small amount is fished in the Mediterranean Sea before the fattening process.

Currently, Malta is conducting a strategy known as *Towards Sustainability 2014–2025*. Its aim is to develop the aquaculture business, emphasising such factors as management and sustainability to increase production and quality. The aims will be achieved through such factors as the composition of feed and the designation of operational aquaculture zones.

#### 3.1.1. PRODUCTION

##### MARINE FISHERIES

Malta is made up of many islands in the eastern basin of the Mediterranean Sea, of which three are inhabited: Malta, Gozo, and Comino. Landings from marine fisheries are made on these three islands. In 2015, 84% of the volume was landed on Malta, and 16% was landed on Gozo and Comino. The Maltese fleet consists of both full-time (399) and part-time (617) vessels, most of which (64%) are 5–10 m and are used mainly for multipurpose fisheries. Some of the most common gear types used by the Maltese fleet are: (1) demersal trawlers, (2) pelagic trawlers, (3) purse-seiners, (4) pots and traps, and (5) hooks and lines.<sup>22</sup>

Specific provisions apply to the Community fishing vessels which operate within the 25-mile management zone around Malta.<sup>23</sup>

Figure 8. MAP OF MALTA



Source: Maps of Europe.

The first-sales value of landings on Malta is dominated by swordfish and bluefin tuna, accounting in 2015 for 26% and 16%, respectively. Because of swordfish and bluefin tuna's significant seasonality, Maltese fishermen supplement their income with a mixed fishery on several demersal and small pelagic species throughout the year, such as red mullet and mackerel.

From 2010 to 2016, the Maltese quota for bluefin tuna rose 40%, to 226 tonnes, following the trend of the EU quota (11.204 tonnes) in the same period (+58%).<sup>24</sup> In 2016, the maximum number of Maltese vessels authorised to fish for, retain on board, transport, or land bluefin tuna in the eastern Atlantic and Mediterranean was 36, of which 35 were longliners and one was a purse-seiner. In the same year, Malta's maximum farming and fattening capacity for bluefin tuna was 12.300 tonnes, while the maximum input from wild catches was 8.768 tonnes.

Table 3. TOP SPECIES LANDED IN MALTA (value in million euro and volume in tonnes)

Species	2012		2013		2014		2015	
	Value	Volume	Value	Volume	Value	Volume	Value	Volume
Swordfish	3,56	503	3,22	460	2,46	377	3,08	489
Bluefin tuna	1,35	137	0,99	155	1,40	156	1,94	180
Red mullet	0,65	99	0,46	66	0,51	58	0,45	60
Mackerel	0,50	249	0,73	308	0,40	852	0,34	626
Other	6,58	1.216	6,85	1.366	5,57	960	5,86	1.082
Total	12,64	2.204	12,25	2.355	10,34	2.403	11,67	2.437

Source: EUMOFA.

##### AQUACULTURE

Aquaculture in Malta is split into two sectors: (1) tuna penning, relying on captured wild fish and referred to as capture-based species (CBS), and (2) the farming of closed-cycle species (CCS), such as seabream, seabass, and other species that are cultured from eggs produced in hatcheries.

The production process for tuna starts with the capture of wild adult fish, preferably weighing more than 70 kg. The species is commonly located and fished in the southern Mediterranean Sea in the months May or June, when it is migrating for spawning purposes. The tuna is transferred to pens for fattening, normally fed with



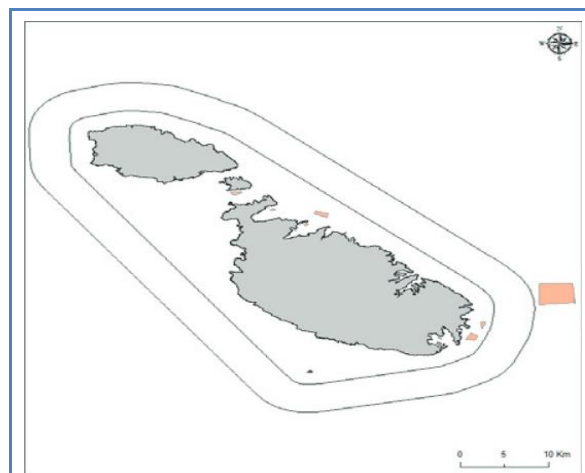
thawed, wet baitfish. In autumn, the individuals have added approximately 30% in bodyweight, making them ready for harvest and sale.

For gilthead seabream, production starts with the hatchery production of fry, stocked in sheltered nursery cages at weights of 2–5 g. The fry are transferred to more exposed cages for the fattening process, which lasts at least 14–16 months. They are harvested at approximately 400 g. Seabass follows the same production procedures, but is grown to a higher weight class, approximately 2–3 kg. Both species are fed with dried pellets.

The CCS species meagre was recently introduced in Malta. It follows the same production pattern as seabream and seabass. The species is well suited to aquaculture, with fast growth, low mortality, and a good food-conversion ratio. However, owing to the lack of consumer familiarity and an appearance perceived as unattractive, no significant market exists at the moment.<sup>25</sup>

Currently, six aquaculture farms operate on Malta from nine sites in designated aquaculture zones. These zones must meet carrying capacity limits established through regulatory and environmental monitoring measures. Four of the six farms produce only CBS or tuna, one farm produces only CCS, and one farm produces both CBS and CCS. The operational aquaculture zones are shown in red in Figure 9.<sup>26</sup>

Figure 9. **MAP OF OPERATIONAL AQUACULTURE ZONES IN MALTA**



Source: Aquaculture strategy for the Maltese islands, 2014-2025, Ministry for Sustainable Development, Environment and Climate Change.

In 2014, aquaculture production reached a total value of EUR 97,34 million, with a volume of 8.606 tonnes. Of this, bluefin tuna accounted for 84% of the value and 63% of the volume.

Table 4. **TOP SPECIES PRODUCED FROM AQUACULTURE IN MALTA** (value in million euro and volume in tonnes)

Species	2011		2012		2013		2014	
	Value	Volume	Value	Volume	Value	Volume	Value	Volume
Bluefin tuna	38,60	1.759	78,91	3.904	92,80	6.123	81,46	5.451
Gilthead seabream	10,19	2.159	11,03	2.605	10,93	2.550	11,98	2.704
European seabass	0,56	54	0,83	126	0,70	127	0,98	190
Other	1,61	100	2,24	806	1,44	277	2,92	261
<b>Total</b>	<b>50,97</b>	<b>4.072</b>	<b>93,01</b>	<b>7.441</b>	<b>105,86</b>	<b>9.077</b>	<b>97,34</b>	<b>8.606</b>

Source: EUMOFA.

### 3.1.2. TRADE

#### EXPORT

Maltese exports of bluefin tuna are the most valuable. In 2015, Malta was the second largest EU exporter of bluefin tuna to all markets outside the EU, with 34% of the value and 35% of the volume. It was the largest exporter to Japan (especially whole frozen bluefin tuna), accounting for 43% of the value and 46% of the volume. More than 90% of total extra-EU exports and Maltese exports of bluefin tuna is exported to Japan.

In 2015, export of seafood products from Malta increased 33% in value and 37% in volume over the previous year, at EUR 82,08 million and 8.294 tonnes.

The increase was driven mainly by increased exports of bluefin tuna to Japan, at EUR 49,06 million (+58%) and 3.839 tonnes (+60%). In 2015, frozen whole bluefin tuna to Japan accounted for approximately 60% of the total export value and 50% of the volume. With an annual Japanese consumption of 50.000 tonnes of bluefin tuna, this product is in high demand. It is estimated that Mediterranean penned tuna contributes approximately 20%, of which Malta contributes 5–10%.<sup>27</sup>

The second largest market for Maltese seafood exports is Italy, where 93% of the value and volume is made up of exports of fresh whole gilthead seabream at EUR 8,29 million and 1.595 tonnes.

Table 5. **TOP SPECIES EXPORTED BY MALTA** (value in million euro and volume in tonnes)

Species	2012		2013		2014		2015	
	Value	Volume	Value	Volume	Value	Volume	Value	Volume
Bluefin tuna	21,43	1.170	45,03	2.636	35,99	2.743	53,22	4.061
Gilthead seabream	7,22	1.755	5,59	1.306	6,79	1.457	8,69	1.683
Skipjack tuna	0	0	0	0	0	0	1,08	125
Other	13,32	1.186	12,69	1.933	18,99	1.856	19,08	2.425
<b>Total</b>	<b>41,98</b>	<b>4.111</b>	<b>63,30</b>	<b>5.875</b>	<b>61,77</b>	<b>6.055</b>	<b>82,08</b>	<b>8.294</b>

Source: EUMOFA.

Table 6. **TOP MARKETS FOR MALTESE EXPORTS OF SEAFOOD** (value in million euro and volume in tonnes)

Country	2012		2013		2014		2015	
	Value	Volume	Value	Volume	Value	Volume	Value	Volume
Japan	26,22	1.363	44,87	2.569	42,41	3.218	55,46	4.316
Italy	7,71	1.846	5,61	1.334	7,66	1.634	8,96	1.720
Spain	0,79	44	0,53	46	2,46	164	6,94	1.377
South Korea	2,85	104	5,12	474	4,65	318	6,26	306
Other	4,40	755	7,18	1.452	4,58	721	4,46	575
<b>Total</b>	<b>41,98</b>	<b>4.111</b>	<b>63,30</b>	<b>5.875</b>	<b>61,77</b>	<b>6.055</b>	<b>82,08</b>	<b>8.294</b>

Source: EUMOFA.

**IMPORT**

In 2015, the total import of seafood products to Malta was EUR 61,39 million and 30.141 tonnes. The main species imported to Malta in 2015 in value was live bluefin tuna from Italy (65%) and France (35%), which is mainly re-exported to other markets (e.g. Japan) after fattening.

When importing live species, it is the responsibility of the Fish and Farming Regulation and Control division (FFRC) of the Ministry of Resource and Rural Affairs (MRRA) to ensure that all live stock arrives in a clinically healthy state and does not originate in areas with unresolved increasing mortality. This legislation is based on a list of notifiable diseases and the species of fish susceptible to those diseases, as defined by the EU authorities.<sup>28</sup>

Table 7. **TOP SPECIES IMPORTED TO MALTA** (value in million euro and volume in tonnes)

Species	2012		2013		2014		2015	
	Value	Volume	Value	Volume	Value	Volume	Value	Volume
Bluefin tuna	32,11	2.164	31,13	2.518	27,37	2.449	16,67	1.538
Skipjack tuna	0	0	0	0	0	0	7,06	1.727
Herring	0,63	529	2,37	2.347	1,91	2.379	6,08	9.040
Mackerel	3,09	3.967	4,96	6.615	4,73	6.564	4,47	6.698
Other	37,66	18.030	38,11	20.829	39,73	17.093	27,23	11.139
<b>Total</b>	<b>73,38</b>	<b>24.690</b>	<b>76,51</b>	<b>32.309</b>	<b>73,67</b>	<b>28.485</b>	<b>61,39</b>	<b>30.141</b>

Source: EUMOFA.

Table 8. **TOP SUPPLIERS OF SEAFOOD TO MALTA** (value in million euro and volume in tonnes)

Country	2012		2013		2014		2015	
	Value	Volume	Value	Volume	Value	Volume	Value	Volume
<b>Italy</b>	29,33	3.722	32,14	3.526	31,79	4.134	23,21	3.377
<b>France</b>	4,88	376	10,19	1.317	9,39	742	6,74	1.182
<b>The Netherlands</b>	4,18	3.192	4,18	3.495	7,31	8.016	6,08	6.622
<b>Spain</b>	5,50	5.592	6,12	6.735	2,61	2.439	5,60	5.824
<b>Other</b>	29,49	11.808	23,88	17.236	22,58	13.154	19,77	13.135
<b>Total</b>	73,38	24.690	76,51	32.309	73,67	28.485	61,39	30.141

Source: EUMOFA.

### 3.1.3. CONSUMPTION

From 2005 to 2014, the domestic consumption of seafood in Malta increased from 30,6 to 32 kg per capita (+5%), making Malta the seventh largest domestic market for seafood per capita in the EU. The development was mainly the result of a national campaign aimed at educating consumers, increasing consumer awareness, and diversifying national consumption patterns. The main species consumed are European hake, chub mackerel, Atlantic horse mackerel, amberjack, ray, European seabass and gilthead seabream, and saddled seabream.

### 3.1.4. FUTURE DEVELOPMENT

The International Commission for the Conservation of Atlantic Tunas (ICCAT) has agreed on a recovery plan for the depleted Mediterranean swordfish stocks, which have been overfished for decades. With scientists advising significant cuts in catches, the plan includes a modest reduction and adoption of a quota system. As swordfish is the most valuable species landed in Malta, the ICCAT agreement will affect Maltese landings.

In June 2014, Malta launched its first National Aquaculture Strategy, towards sustainability 2014–2025. The main objective is to secure

sustainability. According to the strategy, improved management, both regulatory and operational, will improve product quality without damaging the environment and creating conflicts with other coastal and maritime users. Operational aquaculture zones will play an important role.

The main goals include (1) diversifying the overall economy, especially in primary food production; (2) generating employment; (3) creating a stronger and more valuable provider of fish for the local retail and food-service sectors; and (4) contributing positively to the EU trade deficit for seafood products. A specific goal of the strategy is to reach production of 5.000 tonnes from aquaculture, in addition to tuna penning production, by 2020, which will increase the total number of full-time equivalent direct and indirect jobs to approximately 1.185. This can add EUR 70 million gross value to the Maltese economy. To achieve the production goal, Malta will depend on the development of other species, such as amberjack and other Mediterranean species as a main priority, using its already extensive knowledge of breeding techniques of such species. An attempted move to alternative tuna feed will reduce the reliance on baitfish, which will improve sustainability and achieve greater competitiveness.<sup>29</sup>

### 3.2. ALGAE IN THE EU MARKET



EU production of algae has focused traditionally on seaweed harvesting for the extraction of hydrocolloid for industrial purposes. But EU macroalgae production is limited, and the competition with third countries has become significant. However, the demand for edible algae is increasing in EU markets, and new production models and new market stream are emerging.

#### 3.2.1. BIOLOGY, RESOURCES, AND EXPLOITATION

##### BIOLOGY

Marine macroalgae<sup>30</sup>, or seaweeds, are aquatic plants that generally live attached to rock or other hard substrata in coastal areas. They are divided into three different groups, empirically distinguished on the basis of thallus (the algal body) color: **brown algae** also known as **kelp** (phylum *Ochrophyta*, class *Phaeophyceae*), **red algae** (phylum *Rhodophyta*) and **green algae** (phylum *Chlorophyta*, classes *Bryopsidophyceae*, *Chlorophyceae*, *Dasycladophyceae*, *Prasinophyceae*, and *Ulvophyceae*). Red and brown algae are almost exclusively marine, whereas green algae can also be found in inland freshwater, and even in terrestrial situations.<sup>31</sup>

In Europe, the main exploited algae species are *Laminaria hyperborea*, *Laminaria digitata*, and *Ascophyllum nodosum*. These species, and especially kelp forests, are considered among the world's most ecologically dynamic and biologically diverse habitats. Other species are found on the European Atlantic coast, but currently few of them are commercially valuable.

##### RESOURCE, EXPLOITATION, AND MANAGEMENT IN THE EU

Although Asian production is based mostly on the cultivation of algae, the European seaweed industry is based mainly on the harvesting of macroalgae.

On the European Atlantic coast, macroalgae have been harvested by coastal populations for a long time. Two main uses were identified: human consumption and agriculture (cattle food and soil enrichment).

The first recorded commercial use of seaweed was in the 17th century, when it was used for the production of glass (France and Norway).

The commercial value and levels of landings for each species vary and depend on harvesting techniques. The most important, in terms of landings and value, are *Laminaria digitata*, *Laminaria hyperborea* and *Ascophyllum nodosum*, because these species are harvested mechanically by fishing vessel in France and Norway. *Ascophyllum nodosum* is harvested by fishing vessel in Norway, whereas in France and Ireland, it is harvested manually. All other species are harvested manually, either on foot or by diving.<sup>32</sup>

Mechanical harvesting is done by fishing vessels and is practised mainly in Norway (Rogaland to Sør-Trøndelag), France (Brittany), Spain (Galicia and Asturias) and to a lesser degree in the French Basque Country and Ireland.

Manual harvesting of seaweed and gathering of storm-cast seaweed are important in France, Ireland, Spain, and Portugal. Harvesters gather either the cast or cut seaweed at low tide. Diving is another way to harvest seaweed manually and is practised mostly in Portugal.

Management tools differ according to the country, the species, and the harvesting technique. Seaweed harvesting is regulated with different tools: licences or harvesting authorisations, quotas by harvesting zone, individual quotas by boat, harvesting size, and rotation systems. In most harvesting areas, the biomass is not well known, and several current projects aim to assess the importance of the resource in order to adjust the harvesting effort.

However, the preservation of kelp has become a strong environmental concern and some countries have decided to protect these habitats by restricting the use of mechanical harvesting or by creating protected areas around them. Kelp harvesting is blamed for harming the ecosystem because of the damage it can cause to substrata and the habitats of certain species. For example, seaweed harvesting was recently forbidden in the Spanish Basque Country owing to the implementation of a Natura 2000 marine area.

#### 3.2.2. PRODUCTION

##### PRODUCTION

According to FAO production statistics, algae are included in the aquatic plants category (brown, red, and green algae as well as other species such as spirulina). Global algae production, all species included, amounted to 28,5 million tonnes in 2014, a 94% increase in the past decade.

The leading producers are China and Indonesia, which provided 47% and 35%, respectively, of total world production in 2014 (production reached 13,6 and 10,1 million tonnes, respectively). Other important producers were the Philippines with 1,5 million tonnes produced in 2014 (5,4% of world production) and the Republic of Korea with 1,1 million tonnes (3,8%). EU production ranked only 12th in 2014, behind Japan, North Korea, Chile, Malaysia, Norway, and Zanzibar.



In terms of evolution, during the past ten years (2005–2014), total algae production remained relatively stable in North Korea, Chile, and Norway, increased slightly in the Philippines, increased strongly in China, South Korea, Zanzibar, and the EU, and soared in Indonesia and Malaysia. The only decrease in production during the past decade was observed in Japan. However, most of the leading producers have experienced a strong slowdown of this growth (China, Indonesia, Korea, the EU, etc.) or even a slight decrease in production (in the Philippines, for instance).

EU production amounted to more than 93.000 tonnes in 2014, providing approximately 0,3% of the world supply. France (63% of EU production, almost exclusively brown

algae) and Ireland (32%, almost exclusively brown algae) are the main producers. Other important EU producers are Spain (2,3%, mostly red algae) and Italy (1,3%, green and red algae).

From 2005 to 2014, EU algae production increased 67%, with a peak reached in 2013 at 104.000 tonnes. However, among major producers, the evolution of production over the decade has been different: increasing significantly in France (+155%) and Spain (+388%), staying stable in Ireland (+0,3%), and decreasing in Italy (–25%).

Table 9. **WORLD PRODUCTION OF AQUATIC PLANTS** (volume in thousand tonnes)

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>China</b>	9.756	10.019	10.074	10.300	10.772	11.339	11.824	13.090	13.844	13.572
<b>Indonesia</b>	918	1.175	1.733	2.148	2.967	3.918	5.176	6.522	9.316	10.148
<b>Philippines</b>	1.339	1.469	1.505	1.667	1.740	1.802	1.841	1.751	1.559	1.550
<b>Republic of Korea</b>	636	779	811	935	870	915	1.007	1.032	1.140	1.097
<b>Japan</b>	613	604	618	561	561	530	438	539	503	455
<b>Korea Dem. People's Republic</b>	444	444	444	444	444	444	444	444	444	444
<b>Chile</b>	425	339	340	412	456	381	418	440	530	430
<b>Malaysia</b>	40	60	90	111	139	208	239	331	269	245
<b>Norway</b>	154	145	135	154	160	159	152	141	154	154
<b>Tanzania (Zanzibar)</b>	74	77	85	108	103	125	130	151	110	133
<b>EU</b>	56	52	73	74	52	56	81	75	104	93
<b>Total world</b>	<b>14.701</b>	<b>15.352</b>	<b>16.047</b>	<b>17.059</b>	<b>18.431</b>	<b>20.042</b>	<b>21.885</b>	<b>24.671</b>	<b>28.142</b>	<b>28.491</b>

Source: FAO Fishstat (production= harvesting + aquaculture production).

Table 10. **PRODUCTION OF AQUATIC PLANTS IN THE EU** (volume in tonnes)

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
<b>France</b>	23.099	19.192	39.792	39.810	19.032	22.717	47.687	41.579	69.430	58.812
<b>Ireland</b>	29.500	29.500	29.503	29.500	29.500	29.503	29.503	29.509	29.542	29.600
<b>Spain</b>	441	486	134	111	69	125	263	527	1.218	2.154
<b>Italy</b>	1.600	1.400	1.400	1.400	1.400	1.400	1.200	1.200	1.200	1.200
<b>Portugal</b>	624	765	495	198	351	498	461	801	839	786
<b>Estonia</b>	809	394	1.608	1.483	1.032	351	690	430	249	626
<b>Greece</b>	-	-	-	-	-	-	198	174	93	126
<b>Denmark</b>	-	-	-	1.000	1.001	1.000	1.000	1.000	1.800	100
<b>EU total</b>	<b>56.073</b>	<b>51.737</b>	<b>72.932</b>	<b>73.501</b>	<b>52.385</b>	<b>55.594</b>	<b>81.002</b>	<b>75.220</b>	<b>104.370</b>	<b>93.404</b>

Source: FAO Fishstat (production= harvesting + aquaculture production). No reported production means that data is not available.

## PROCESSING

The European seaweed processing industry is divided into two main categories: those producing alginic acid (alginate) and those producing products for agriculture (fertilizer and animal feed). The production of alginate and the production of cattle food require large quantities of raw material. To limit the cost of transporting wet material and remain competitive with the importation of dried material, industries often settle close to seaweed harvesting areas.

In France, for example, the two main companies are located in Northwest Brittany, where the most important kelp forest is found.

In Ireland, the company processing *A. nodosum* is located on the west coast, where seaweed is gathered. Other small companies are located in the same area.

Recently however, the seaweed processing industry has contracted. This trend has been caused by the decrease in seaweed stocks, the high cost of European labour, and environmental constraints.

Local seaweed production is not sufficient to satisfy the high demand of the processing industries and especially for those extracting alginates. The processing industries, which have access to the raw material locally (France and Ireland, for example), also import dried seaweed when local supplies are out of season or insufficient. Some processors can choose to delocalise their processing plants to third countries, where they can access inexpensive raw materials and inexpensive labour (Chile, the Philippines, and China).

Nowadays, the European seaweed industry can supply several markets (human consumption, cosmetics, pharmacology, etc.), but seaweed is used mainly to produce hydrocolloids:

- **Alginate:** extracted from brown algae, used in the pharmaceutical industry and in the production of textiles as well as in many other applications, for their good gelling and bio-active properties.
- **Agar-agar:** extracted from red algae, it is a good gelling agent used as a substrate for culturing media and for the food-processing industry.
- **Carrageenan:** extracted from red algae, used especially in the manufacturing of dairy products and meat reconstruction, for their thickening, gelling, and stabilising properties. It is used for example in the fish-finger processing industry.

Some species are exploited and used for human consumption and particularly in France, Spain (Galicia), and Ireland, where several companies harvest edible seaweed. These new types of industry have developed recently, following the increasing demand from European consumers. All edible algae are harvested manually and dried artisanally.

Moreover, the recent interest from the bio-fuel and bio-tech industries in the macroalgae sector will probably generate further perspectives. The Horizon 2020 (EU Framework Programme for Research and Innovation) project GENIALG gathers researchers and stakeholders from the algae sector to produce *Saccharina latissimi* and *Ulva sp.* to process in biorefineries. These new perspectives may also lead to the development of macroalgae farming in Europe, for which several projects are currently in development, but face strong constraints.<sup>33</sup>

## 3.2.3. TRADE

### EU TRADE

Since 2012, EU trade-data nomenclature distinguishes seaweed and other algae<sup>34</sup> fit for human consumption and those unfit for human consumption.

In 2015, the EU had a trade deficit of EUR 13 million for algae fit for human consumption and EUR 40 million for algae unfit for human consumption. The deficits may be attributable to the imports of macroalgae for the processing industry (mainly from Iceland) and the relatively low share of EU production dedicated to food use.

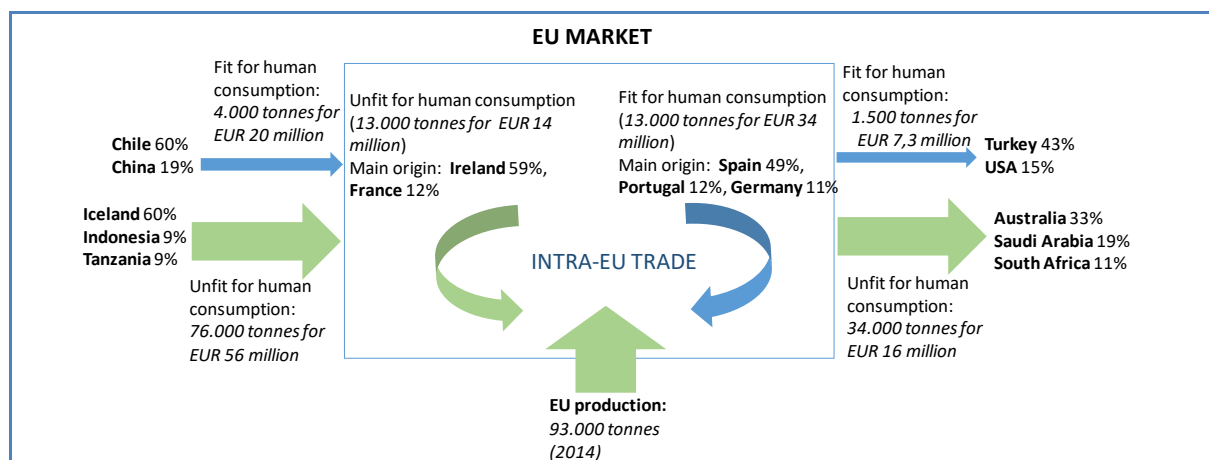
For algae unfit for human consumption, the main extra-EU suppliers are Iceland (46.000 tonnes in 2015), Indonesia (7.100 tonnes), and Tanzania (6.600 tonnes).

For algae fit for human consumption, the main extra-EU suppliers are Chile (approximately 2.500 tonnes in 2015) and China (800 tonnes).

Intra-EU trade is active for each type of product. France and Ireland are the main suppliers of algae unfit for human consumption, whereas Spain, Portugal, and Germany are the main suppliers of algae fit for human consumption.

Exports of algae fit for human consumption are relatively low and main destinations are Turkey (660 tonnes in 2015) and the USA (230 tonnes). However, exports of algae unfit for human consumption reached 34.000 tonnes in 2015. The main destinations were Australia (11.300 tonnes), Saudi Arabia (6.400 tonnes), and South Africa (3.700 tonnes).

Figure 10. EU TRADE BALANCE OF SEAWEED AND OTHER ALGAE IN 2015

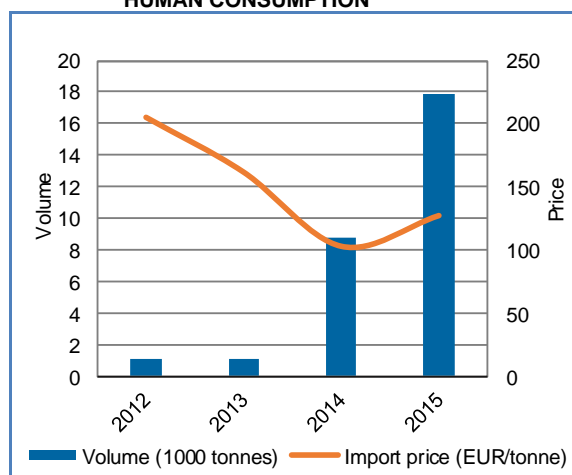


Source: EUMOFA based on COMEXT.

### 3.2.4. IMPORT TRENDS AND PRICES

In France, the largest algae producer and processor in the EU, the import of algae unfit for human consumption experienced a strong increasing trend from 2013 to 2015 from approximately 1.000 tonnes to 18.000 tonnes. This strong increase may be attributable to the increasing needs of the processing industry as well as a decrease in harvesting French production in 2015. At the same time, the average import price dropped 38%, falling from 205 EUR/tonne to 128 EUR/tonne.

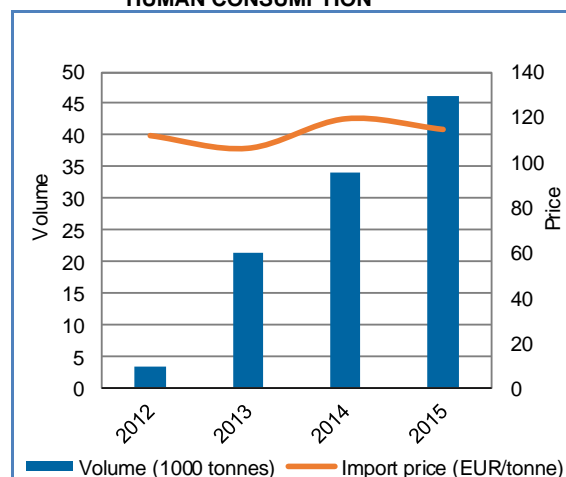
Figure 11. FRANCE: IMPORTS OF ALGAE UNFIT FOR HUMAN CONSUMPTION



Source: FAO and EUMOFA.

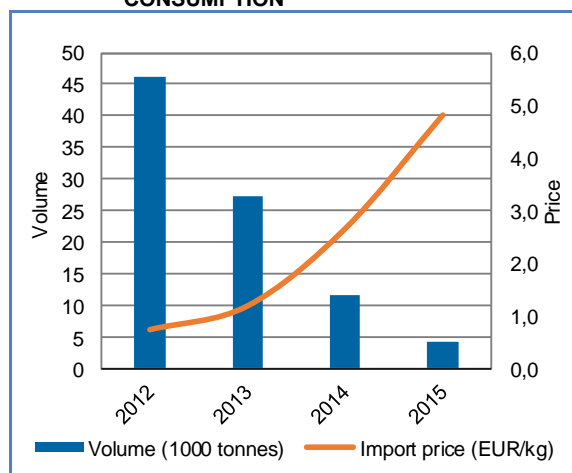
In Ireland, the import volume increased significantly between 2012 and 2015 (from 3.000 tonnes to 46.000 tonnes), mainly to supply the processing industry. But the average import price has remained stable over the period, fluctuating between 106 EUR/tonne and 119 EUR/tonne.

Figure 12. IRELAND: IMPORTS OF ALGAE UNFIT FOR HUMAN CONSUMPTION



Source: FAO and EUMOFA.

A strong decline in imported volumes of EU imports of algae fit for human consumption is noticeable, falling from 46.000 tonnes in 2012 to 4.000 tonnes in 2015. Over the period, on the contrary, prices experienced a strong increasing trend, 0,74 EUR/kg to 4,82 EUR/kg. This significant trend may be explained by more local supply of algae for food use in the EU or by imports including more added-value algae products.

Figure 13. **EU IMPORTS OF ALGAE FIT FOR HUMAN CONSUMPTION**

Source: FAO and EUMOFA.

### 3.2.5. CONSUMPTION

Human consumption of algae has always been important in Asian countries, especially in Japan and China, where algae farming is intensive, but also traditionally in European coastal communities (for example in France, Norway, Wales, and Ireland).

The most important Asian species for human consumption are Nori (*Porphyra* species), Kombu (*Laminaria* and *Saccharina* species), and Wakame (*Undaria pinnatifida*). Nori are especially used in many sushi dishes, for rice balls and as a condiment for various noodle, soup, and other dishes.

In addition to consumption in Asian restaurants, there is renewed interest in European countries in the consumption of seaweeds, because of their rich protein and mineral content and because they are considered healthy and natural.<sup>35</sup>



## 4. Consumption

### HOUSEHOLD CONSUMPTION IN THE EU

In October 2016, the consumed volume of fresh fisheries and aquaculture products decreased in nine Member States, increased in two and remained stable in one, compared with October 2015. Values increased in four Member States and decreased in eight.

In volume, an increase in consumed fresh fisheries and aquaculture products was observed in Hungary (+9%)

and Ireland (+7%). The largest drop in volume was observed in the UK (-46%), followed by Sweden (-25%) and Denmark (-18%).

In October 2016, the greatest decrease in consumption value was also observed in the UK (-56%), Sweden (-15%) and Denmark (-16%). The greatest increase was 16%, registered in Ireland.

Table 11. **OCTOBER OVERVIEW OF THE REPORTING COUNTRIES** (volume in tonnes and value in million EUR)

Country	Per capita consumption 2014* (live weight equivalent) Kg/capita/year	October 2014		October 2015		September 2016		October 2016		Change from October 2015 to October 2016	
		Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
Denmark	22,1	904	13,01	840	12,23	587	8,92	693	10,24	18%	16%
Germany	13,3	5.080	65,74	6.256	77,65	5.203	72,96	5.956	81,49	5%	5%
France	34,4	21.266	204,85	21.259	203,49	20.119	201,11	20.122	209,41	5%	3%
Hungary	4,6	386	1,7	381	2,0	264	1,66	414	1,8	9%	10%
Ireland	23,0	783	10,28	872	11,70	881	12,33	929	13,53	7%	16%
Italy	28,9	23.042	109,92	26.154	211,57	29.873	244,24	23.111	202,20	12%	4%
Netherlands	22,6	2.334	24,46	2.612	27,97	2.057	25,16	2.622	28,48	0%	2%
Poland	13,0	4.894	26,23	5.387	28,07	4.063	21,80	4.533	24,45	16%	13%
Portugal	55,3	4.720	26,31	5.380	31,46	4.544	27,87	5.065	30,89	6%	2%
Spain	46,2	60.259	420,72	61.937	463,41	54.069	391,72	59.040	424,14	5%	8%
Sweden	33,2	1.356	15,51	1.441	16,70	735	10,60	1.080	14,12	25%	15%
UK	24,9	45.953	474,08	45.255	512,97	22.433	228,15	24.266	223,71	46%	56%

Source: EUMOFA (updated 13.01.2017).

\* Data on per capita consumption of all fish and seafood products for all EU Member States can be found at:

<http://www.eumofa.eu/documents/20178/77960/The+EU+fish+market+-+2016+Edition.pdf/ca1e7801-c4da-4799-aa00-f3d1784a3021>

Generally, in the past three Octobers, an increase in the consumption trend (volume and value) was observed in France, Germany, Ireland, Italy, the Netherlands, Poland, Portugal, Spain, and Sweden, and decreased in the UK. In Denmark and Hungary, the consumption increased in volume; however, value decreased.

In October, the level of consumption was above the yearly average in Germany, France, the Netherlands, Spain, and Sweden. In Ireland, Italy, Poland, and the UK, the consumed volumes remained below the yearly average. Since 2013, the October volume of consumption of fresh fisheries and aquaculture products has fluctuated in Denmark and Hungary.

In value, consumption was lower than the yearly average in Hungary, Ireland, Italy, and the UK. In Denmark, Germany, France, Poland, Spain, and Sweden, the consumption value remained higher than average in October, whereas in the Netherlands and Portugal it fluctuated.

#### 4.1. MONK



**Habitat:** A demersal species living on sandy and muddy sediments.<sup>36</sup>

**Catch area:** The coastal areas of the Northeast Atlantic, from the Barents Sea to the Strait of Gibraltar, and the Mediterranean and Black seas.<sup>37</sup>

**Main producing countries in Europe:** France, the UK, Ireland, Denmark, Spain, and Portugal.<sup>38</sup>

**Production method:** Caught.

**Main consumers in the EU:** France, Spain, and the UK.

**Presentation:** Headed and gutted, sometimes peeled, or in fillets.

**Preservation:** Fresh or frozen.

**Ways of preparation:** Baked, grilled, steamed.

#### GENERAL OVERVIEW OF HOUSEHOLD CONSUMPTION IN FRANCE AND SPAIN

Overall per capita consumption in France and Spain is above the EU average. In France, per capita consumption of fish and seafood products was 34,4 kg in 2014, 35% higher than the EU average (25,5 kg). It remained stable compared with 2013. Spain registered 46,2 kg per capita consumption of fish and seafood products in 2014. It was 81% higher than the EU average and 34% higher than per capita consumption in France. Per capita consumption in Spain increased 5% over the previous year. See more on per capita consumption in the EU in table 11.

France and Spain are among the main producers of monk in the EU. Both countries' production has been stable over the past decade. In 2014, France produced 40% of the EU production, and Spain 14%. Spain, however, is the main monk importer in the EU.<sup>39</sup>

France is among the main suppliers of fresh monk, whereas Spain is among the main suppliers of frozen monk.<sup>40</sup>

During January 2013–October 2016, retail prices of monk demonstrated a decreasing trend in France and an opposite trend in Spain. In France, the consumed volume of monk remained relatively stable with a slightly increasing trend, whereas in Spain consumption volumes decreased and fluctuated significantly with high peaks during winter. The volume sold in Spain was more than three times higher than in France. By contrast, prices in Spain were 35% lower than in France.

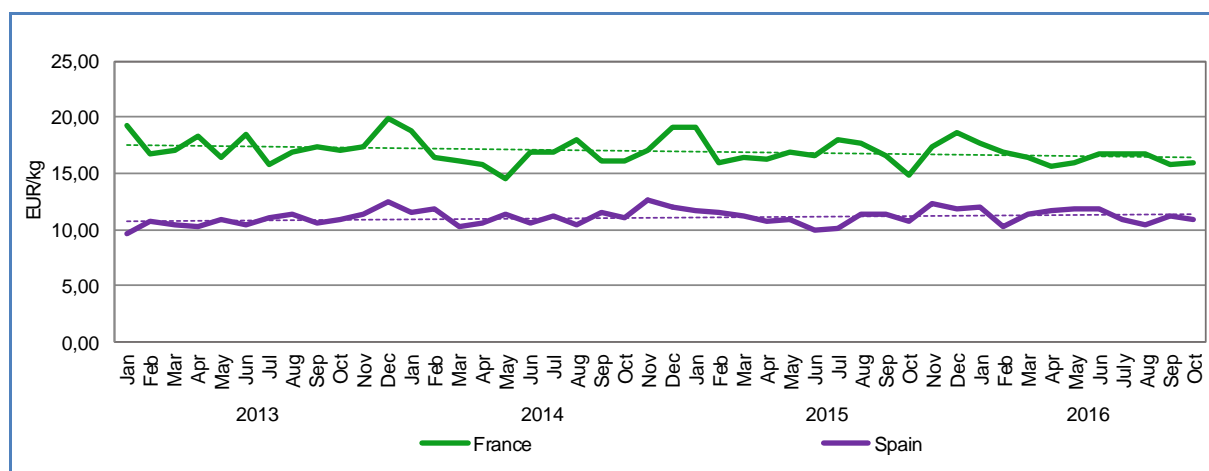
We have covered **Monk** in previous *Monthly Highlights*:

First sales: Belgium (8/2016, 4/2015, 2/2014), France (1/2015, March 2013), the United Kingdom (5/2016, July 2013)

Case study: Monk in the EU market (10/2016)

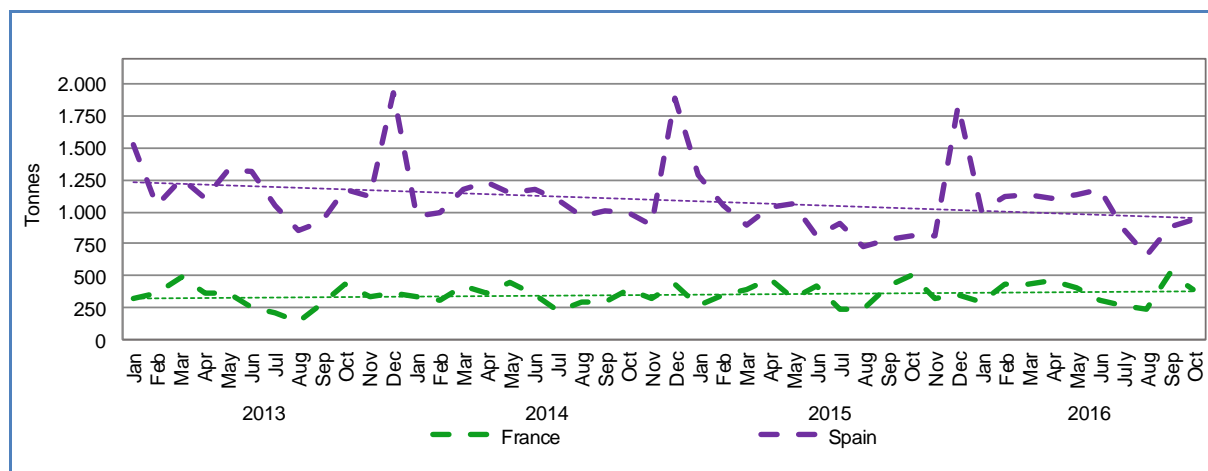
Price structure in France (March 2013)

Figure 14. RETAIL PRICES OF FRESH MONK



Source: EUMOFA (updated 13.01.2017).

Figure 15. VOLUME SOLD OF FRESH MONK



Source: EUMOFA (updated 13.01.2017).

## FRANCE

**Long-term trend, January 2013–October 2016:** decreasing in price and increasing in volume.

**Average price:** 17,54 EUR/kg (2013), 16,78 EUR/kg (2014), 17,02 EUR/kg (2015).

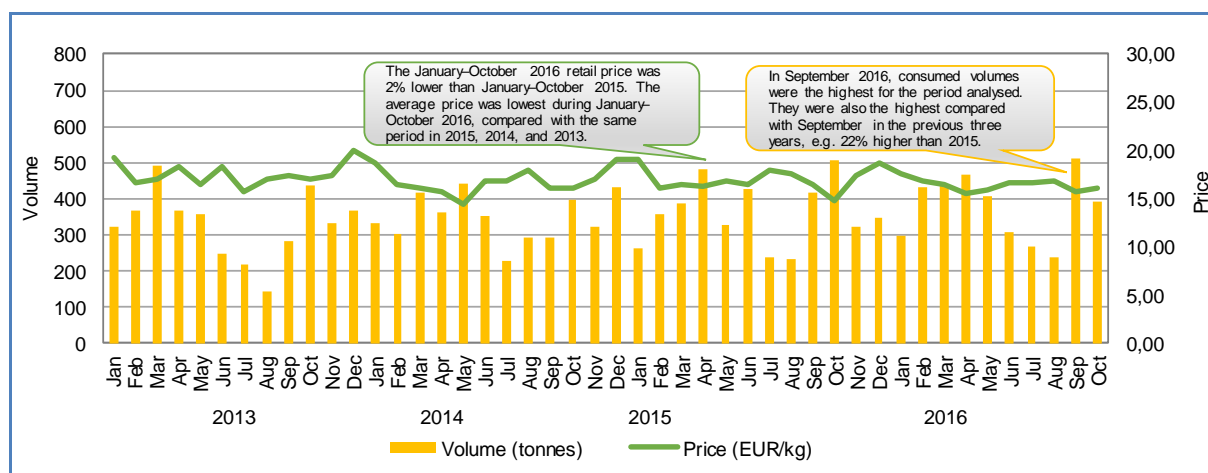
**Total consumed volume:** 3.932 tonnes (2013), 4.176 tonnes (2014), 4.301 tonnes (2015).

**Short-term trend, January–October 2016:** decreasing in price and increasing in volume.

**Average price:** 16,44 EUR/kg.

**Total consumed volume:** 3.754 tonnes.

Figure 16. RETAIL PRICE AND VOLUME SOLD OF FRESH MONK



Source: EUMOFA (updated 13.01.2017).

## SPAIN

**Long-term trend, January 2013–October 2016:** increasing in price and decreasing in volume.

**Average price:** 10,81 EUR/kg (2013), 11,22 EUR/kg (2014), 11,13 EUR/kg (2015).

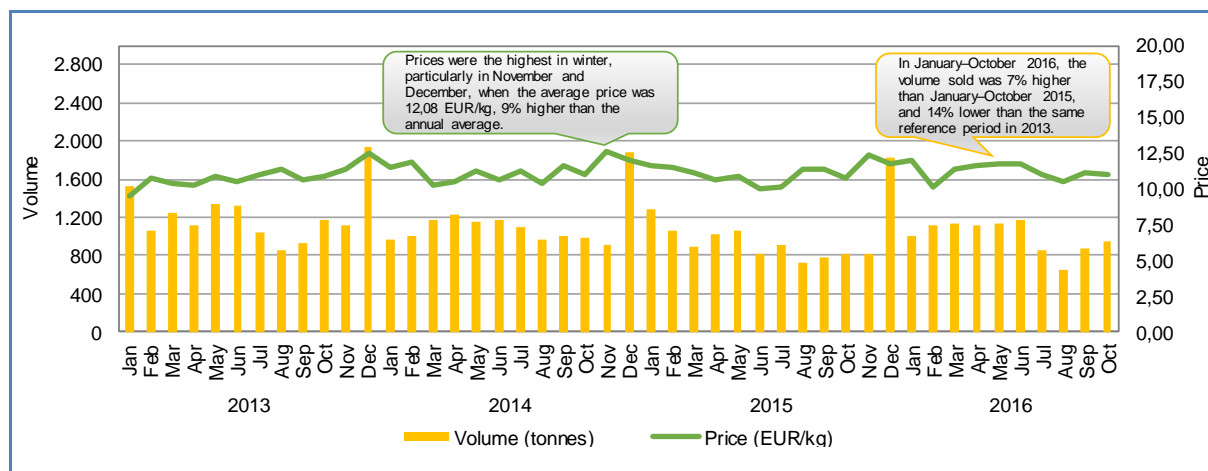
**Total consumed volume:** 14.667 tonnes (2013), 13.557 tonnes (2014), 12.043 tonnes (2015).

**Short-term trend, January–October 2016:** increasing in price and decreasing in volume.

**Average price:** 11,21 EUR/kg.

**Total consumed volume:** 10.022 tonnes.

Figure 17. RETAIL PRICE AND VOLUME SOLD OF FRESH MONK



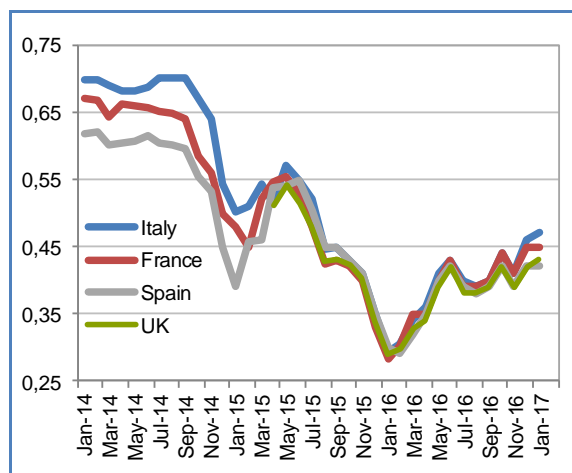
Source: EUMOFA (updated 13.01.2017).



## 5. Macroeconomic context

### 5.1. MARINE FUEL

Figure 18. **AVERAGE PRICE OF MARINE DIESEL IN ITALY, FRANCE, SPAIN, AND THE UK (EUR/LITRE)**



Source: Chamber of Commerce of Forlì-Cesena, Italy; DPMA, France; Spain; ARVI (January 2013–March 2015); MABUX (June 2015–January 2017).

In January 2017, the fuel price in the French ports of Lorient and Boulogne was 0,45 EUR/litre and remained stable compared with December 2016. It increased 59% over January 2016.

In the Italian ports of Ancona and Livorno, the average price of marine fuel in January 2017 was 0,47 EUR/litre. It increased 2% from the previous month and 60% compared with January 2016.

The price of marine fuel in the ports of A Coruña and Vigo, Spain, reached on average 0,42 EUR/litre in the first month of 2017, and remain unchanged compared with December 2016. It increased 40% compared with January 2016.

The fuel price observed in the UK ports of Grimsby and Aberdeen was 0,43 EUR/litre in January 2017 and increased 2% compared with the previous month. Compared with the same month a year ago, the fuel price increased 48%.

### 5.2. FOOD AND FISH PRICES

Annual EU inflation was 1,2% in December 2016, up from 0,6% in November. In December 2016, the lowest negative annual rates were observed in Bulgaria (–0,5%), Ireland (–0,2%) and Romania (–0,1%), while the highest annual rates were registered in Estonia (+2,4%), Belgium (+2,2%), the Czech Republic and Latvia (both +2,1%).

Compared with November 2016, annual inflation fell in 1 Member State, remained stable in 1, and rose in 26.

In December 2016, prices of both food and non-alcoholic beverages and fish and seafood increased slightly 0,5% and 0,7%, respectively, compared with November 2016.

Compared with December the previous year, both food and fish prices increased 1,1% and 3,0%, respectively.

Table 12. **HARMONISED INDEX OF CONSUMER PRICES IN THE EU (2015 = 100)**

HICP	Dec 2014	Dec 2015	Nov 2016	Dec 2016
<b>Food and non-alcoholic beverages</b>	99,53	99,76	100,30	100,81
<b>Fish and seafood</b>	99,59	101,23	103,54	104,28

Source: Eurostat.

### 5.3. EXCHANGE RATES

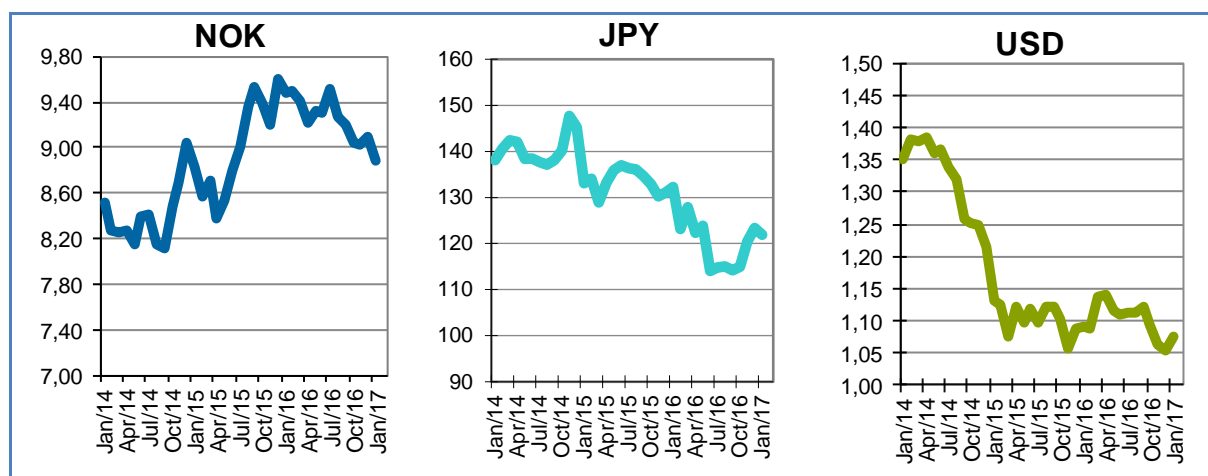
In January 2017, the euro depreciated both against the Norwegian krone (–2,2%) and the Japanese yen (–1,2%), and appreciated against the US dollar (+2,0%) from December 2016. For the past six months, the euro has fluctuated around 1,09 against the US dollar. Compared with January 2016, the euro has depreciated –2,2% against the Norwegian krone, and –7,8% against the Japanese yen and –1,5% against the US dollar.

Table 13. **THE EURO EXCHANGE RATES AGAINST THREE SELECTED CURRENCIES**

Currency	Jan 2015	Jan 2016	Dec 2016	Jan 2017
<b>NOK</b>	8,8335	9,4845	9,0863	<b>8,8880</b>
<b>JPY</b>	133,08	132,25	123,40	<b>121,94</b>
<b>USD</b>	1,1305	1,0920	1,0541	<b>1,0755</b>

Source: European Central Bank.

Figure 19. TREND OF EURO EXCHANGE RATES



Source: European Central Bank.

#### 5.4. EUROPEAN UNION ECONOMIC OVERVIEW

The annual GDP growth rate of the EU increased by 0,6% in October–December 2016 compared with the previous quarter. Compared with the same quarter of the previous year, seasonally adjusted GDP grew by 1,9% in the fourth quarter of 2016. During 2016, the GDP rose by 1,9% compared with 2015.<sup>41</sup>

In the third quarter, the EU GDP growth rate was 0,4%, unchanged compared with the second quarter of 2016.

The annual GDP growth rate also remained unchanged since the first quarter of the year.

In the five largest EU Member States in the third quarter of 2016, the GDP growth rate decelerated in Germany, Spain and the UK and accelerated in Italy and France. In Italy, GDP growth increased with a quarterly rate of 0,3% and in France and Germany 0,2%. The UK registered a quarterly GDP growth rate of 0,5%, down from 0,7%, and Spain 0,7% after 0,8% in the previous quarter.<sup>42</sup>

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#### THIS REPORT HAS BEEN COMPILED USING EUMOFA DATA AND THE FOLLOWING SOURCES:

**First sales:** EUMOFA; Puertos del estado; Autoridad Portuaria de Vigo; ITAFISHSTAT. Data analysed refers to the month of November 2016.

**Global supply:** Faroese Ministry of Fisheries; Japanese Ministry of Agriculture, Forestry and Fisheries; Statistics Iceland; Australian Department of Agriculture and Water Resources; Office National des Pêches, Morocco; Friend of the Sea; Vietnam Association of Seafood Exporters and Producers; <http://www.ouest-france.fr/>; Norwegian Seafood Council.

**Case study:** EUMOFA; National Statistics Office, Malta; EU Law and Publications; Parliamentary Secretary for the EU Presidency 2017 and EU Funds, Malta; Aquaculture strategy for the Maltese islands; <http://www.seaweed.ie/>; <http://www.netalgae.eu>.

**Consumption:** EUMOFA.

**Macroeconomic context:** EUROSTAT; ECB; Chamber of Commerce of Forlì-Cesena, Italy; DPMA, France; ARVI, Spain; MABUX.

The underlying first-sales data is in a separate Annex available on the EUMOFA website. Analyses are made at aggregated (main commercial species) level.

The European Market Observatory for Fisheries and Aquaculture Products (EUMOFA) was developed by the European Commission, representing one of the tools of the new Market Policy in the framework of the reform of the Common Fisheries Policy. [Regulation (EU) No 1379/2013 art. 42].

As a **market intelligence tool**, EUMOFA provides regular weekly prices, monthly market trends, and annual

structural data along the supply chain.

The database is based on data provided and validated by Member States and European institutions. It is available in 24 languages.

EUMOFA website is publicly available at the following address: [www.eumofa.eu](http://www.eumofa.eu).



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## 6. Endnotes

<sup>1</sup> Bivalves and other molluscs and aquatic invertebrates, cephalopods, crustaceans, flatfish, freshwater fish, groundfish, miscellaneous aquatic products, other marine fish, salmonids, small pelagics, tuna and tuna-like species.

<sup>2</sup> Data refer to 31 government-owned ports. [http://www.puertos.es/en-us/estadisticas/Pages/estadistica\\_mensual.aspx](http://www.puertos.es/en-us/estadisticas/Pages/estadistica_mensual.aspx)

<sup>3</sup> <http://www.apvigo.com/ficheros/descargas/4152.pesca.noviembre.2016.pdf>

<sup>4</sup> ITAFISHSTAT, EUROFISH Magazine April 2/2016. [https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/op-italy-fact-sheet\\_en.pdf](https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/op-italy-fact-sheet_en.pdf)

<sup>5</sup> Data concerning first sales of Main Commercial Species “clam” in the port of Chioggia are excluded from the analysis.

<sup>6</sup> <http://www.ismea.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/2244/UT/systemPrint>; EUROFISH Magazine 5/2016, [https://issuu.com/eurofish/docs/eurofish\\_magazine\\_5\\_2016/58](https://issuu.com/eurofish/docs/eurofish_magazine_5_2016/58)

<sup>7</sup> <http://www.fao.org/fishery/species/2598/en>

<sup>8</sup> <http://www.faoadriamed.org/html/Species/ParapenaeusLongirostris.html>

<sup>9</sup> EUROFISH Magazine 2/2016, [https://issuu.com/eurofish/docs/eurofish\\_magazine\\_2\\_2016/42](https://issuu.com/eurofish/docs/eurofish_magazine_2_2016/42)

<sup>10</sup> [https://gfcmsitestorage.blob.core.windows.net/documents/SAC/SAF/DemersalSpecies/2014/DPS\\_GSA\\_12-16\\_2014\\_ITA\\_MLT\\_TUN.pdf](https://gfcmsitestorage.blob.core.windows.net/documents/SAC/SAF/DemersalSpecies/2014/DPS_GSA_12-16_2014_ITA_MLT_TUN.pdf)

<sup>11</sup> <http://www.fao.org/gfcm/decisions/en/>

<sup>12</sup> <http://www.fao.org/3/a-i5496e.pdf>

<sup>13</sup> [http://www.ouest-france.fr/bretagne/lorient-56100/lorient-reste-le-premier-port-de-peche-de-france-4725849?utm\\_source=neolane\\_of-ofe\\_newsletter&utm\\_medium=email&utm\\_campaign=of-ofe\\_newsletter&utm\\_content=20170112&vid=1246084](http://www.ouest-france.fr/bretagne/lorient-56100/lorient-reste-le-premier-port-de-peche-de-france-4725849?utm_source=neolane_of-ofe_newsletter&utm_medium=email&utm_campaign=of-ofe_newsletter&utm_content=20170112&vid=1246084)

<sup>14</sup> <http://www.fisk.fo/kunning/tidindi/foroyar-og-gronland-hava-vidkad-avtalu-na-um-fiskiveidiraettindi-fyri-2017/>

<sup>15</sup> <http://www.statice.is/publications/news-archive/fisheries/fish-catches-in-december-2016/>

<sup>16</sup> Monthly statistics of agriculture, forestry and fisheries (Ministry of Agriculture, Forestry and Fisheries – December 2016).

<sup>17</sup> Australian fisheries and aquaculture statistics 2015 (ABARES/department of Agriculture and Water Resources, December 2016).

<sup>18</sup> <http://www.onp.ma/wp-content/uploads/2017/01/RAPPORT-STATISTIQUE-2016.pdf>

<sup>19</sup> <http://www.friendofthesea.org/news-doc.asp?CAT=1&ID=1023&page=>

<sup>20</sup> [http://seafood.vasep.com.vn/seafood/50\\_11665/vietnams-shrimp-exports-to-eu-increase-75.htm](http://seafood.vasep.com.vn/seafood/50_11665/vietnams-shrimp-exports-to-eu-increase-75.htm)

<sup>21</sup> <http://en.seafood.no/News-and-media/News-archive/Press-releases/Seafood-exports-worth-NOK-91.6-billion-in-2016>

<sup>22</sup> [https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/op-malta\\_mt.pdf](https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/op-malta_mt.pdf)

<sup>23</sup> [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006R1967R\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006R1967R(01)&from=EN)

<sup>24</sup> <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0072&from=EN>

<sup>25</sup> [https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/DRAFT\\_AQUACULTURE\\_STRATEGY\\_FOR\\_MALTA\\_MARCH\\_2012\[1\].pdf](https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/DRAFT_AQUACULTURE_STRATEGY_FOR_MALTA_MARCH_2012[1].pdf)

<sup>26</sup> <http://msdec.gov.mt/en/Document%20Repository/Aquaculture%20Strategy%202014-25.pdf>

<sup>27</sup> [https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/DRAFT\\_AQUACULTURE\\_STRATEGY\\_FOR\\_MALTA\\_MARCH\\_2012\[1\].pdf](https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/DRAFT_AQUACULTURE_STRATEGY_FOR_MALTA_MARCH_2012[1].pdf)

<sup>28</sup> [https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/DRAFT\\_AQUACULTURE\\_STRATEGY\\_FOR\\_MALTA\\_MARCH\\_2012\[1\].pdf](https://eufunds.gov.mt/en/EU%20Funds%20Programmes/Agricultural%20Fisheries%20Fund/Documents/DRAFT_AQUACULTURE_STRATEGY_FOR_MALTA_MARCH_2012[1].pdf)

<sup>29</sup> <http://msdec.gov.mt/en/Document%20Repository/Aquaculture%20Strategy%202014-25.pdf>

<sup>30</sup> Refers to several species of macroscopic, multicellular, marine algae, as opposed to phytoplankton (microalgae).

<sup>31</sup> <http://www.seaweed.ie/algae/seaweeds.php>

<sup>32</sup> Netalgae project [http://www.netalgae.eu/uploadedfiles/Filieres\\_12p\\_UK.pdf](http://www.netalgae.eu/uploadedfiles/Filieres_12p_UK.pdf)

<sup>33</sup> Netalgae project [http://www.netalgae.eu/uploadedfiles/Filieres\\_12p\\_UK.pdf](http://www.netalgae.eu/uploadedfiles/Filieres_12p_UK.pdf)

<sup>34</sup> Seaweed and other algae, fresh, chilled, frozen, or dried whether ground or not.

<sup>35</sup> [http://www.seaweed.ie/uses\\_general/humanfood.php](http://www.seaweed.ie/uses_general/humanfood.php)

<sup>36</sup> <http://www.eumofa.eu/documents/20178/22933/Monthly+Highlights+-+N.10-2016.pdf>

<sup>37</sup> <http://www.eumofa.eu/documents/20178/22933/Monthly+Highlights+-+N.10-2016.pdf>

<sup>38</sup> <http://www.eumofa.eu/documents/20178/22933/Monthly+Highlights+-+N.10-2016.pdf>

<sup>39</sup> <http://www.eumofa.eu/documents/20178/22933/Monthly+Highlights+-+N.10-2016.pdf>

<sup>40</sup> <http://www.eumofa.eu/documents/20178/22933/Monthly+Highlights+-+N.10-2016.pdf>

<sup>41</sup> <http://ec.europa.eu/eurostat/documents/2995521/7844044/2-31012017-AP-EN.pdf>

<sup>42</sup> <http://ec.europa.eu/eurostat/documents/3217494/7828197/KS-BJ-17-001-EN-N.pdf>