SEAFISH
the authority on seafood

# SR681 **Outlook for European brown crab:** *Understanding brown crab production and consumption in the UK, Republic of Ireland, France, Spain and Portugal*

Author: A Garrett et al.

June 2015

ISBN no. 978-1-906634-87-2

ACRUNET

ATLANTIC CRAB RESOURCE USERS NETWORK

# **Outlook for European brown crab:** *Understanding brown crab production and consumption in the UK, Republic of Ireland, France, Spain and Portugal*

Report produced by:

Angus Garrett (Seafish, UK), Ian Lawler (BIM, Republic of Ireland), Marta Ballesteros (CETMAR, Spain), Antonio Marques (IPMA, Portugal), Clare Dean (Seafood Scotland, UK), Dominique Schnabele (FranceAgrimer, France), in collaboration with the brown crab industry.

This report is an output of Acrunet project Activity 5.

Date: June 2015

**Contents** **Page**

**1. Purpose**

- The purpose of Activity 5 is to explore and understand the shifting landscape of brown crab production and consumption, wider developments and risks arising, in order to guide stakeholder action and improve industry resilience.
- The stakeholders within brown crab production and consumption range from those directly involved in catching, handling, trading, selling and consuming brown crab (industry). Stakeholders also concern those indirectly influencing industry activity e.g. policymakers, scientific community and (potentially) Non-Governmental Organisations – NGOs.
- Activity 5, and its emphasis on dialogue with stakeholders, can support:
    - Shared understanding and concerted action amongst industry
    - A science-policy interface
    - Near term decision-making and longer term pathways (focus for future work).
- For newcomers to Acrunet, and Activity 5 in particular, this work is best described as a long term process that builds understanding of brown crab through regular intervals. Through regular dialogue with industry, and discrete research actions, an outline sketch is refined to better represent the brown crab landscape. With better representation, the landscape is then used to support and guide near term actions and longer term direction.

**2. Industry landscape - Brown crab system**

**2.1 Introduction**

- Brown crab production and consumption is underpinned by a range of industry functions and activity.
- These functions interrelate as systems in the delivery of brown crab products. Understanding functions and how they interrelate supports industry understanding of direct and indirect risks, opportunities and threats. Although the brown crab industry is complex, dynamic and gives rise to a diverse range of products, there are general patterns regardless of product and regional location.
- By the term brown crab products we principally mean any food product derived from the species *Cancer pagurus* but also any related products that may be used for other purposes such as bait.
- The basic industry functions underpinning the production and consumption of brown crab include:
    - Stocks (the geographical and ecological context for the source of brown crab – waters of the North East Atlantic concerning the UK, Rep of Ireland, France mainly).
    - Capture production.
    - Transport and distribution (concerning the movement of brown crab between stages of production: road, sea and air).
    - Processing/storage (concerning receiving/preparation/preservation and packing of brown crab)
    - Market/Sales outlet (concerning export/retail/food service/wholesale – UK, Rep of Ireland, France, Spain, Portugal and external export markets).
    - Consumption (concerning in-home and out of home consumption).
    - Waste (concerning the collection/treatment of waste products – including packaging to landfill, incineration, recycling, or composting).
- Boundaries for the system are provided by the key country partners in the Acrunet network i.e. the UK, Rep of Ireland, France, Spain, Portugal and 3rd countries such as Norway, Germany, Italy and China (to the extent these exert a significant influence on this system).
- There are a number of limitations associated with characterising a constantly shifting industry landscape:
    - The first is that understanding the landscape draws on both evidence and experience and so inevitably reflects opinion and a degree of conjecture.
    - The second is that the depth of evidence and experience is necessarily limited (due to limited resources) so, in some instances, one area may be used as a proxy for another, similar, area. For

example insights from Spain are used as a proxy for Portugal, or the UK is used as a proxy for the Rep of Ireland (and vice versa).
  - The third is that the landscape can only be provisional to current circumstances.
  - Finally this landscape can only be a *guide* to near term action and longer term direction (future trends and developments may turn out very different to current understanding).

### 2.2 General overview of brown crab production and consumption

- The brown crab system identifies the key stakeholders and activities that may be impacted positively or negatively by wider developments.
- Fig. 1 illustrates the general overview of the brown crab system

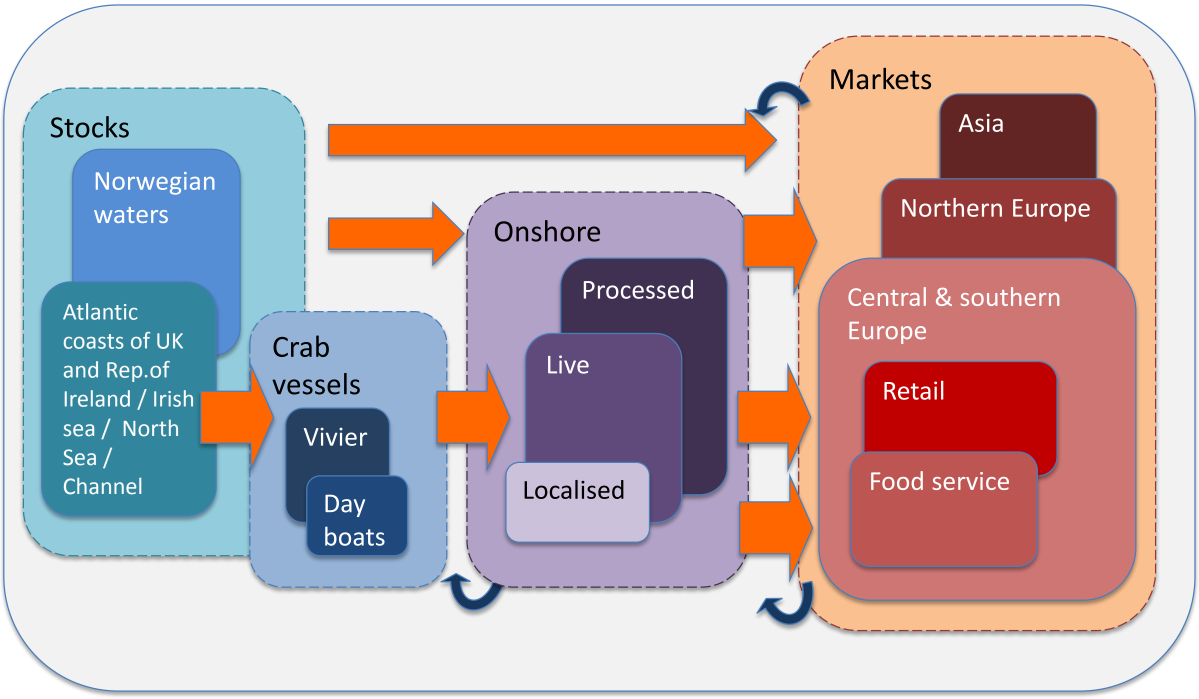



*Fig 1.Brown crab from European waters to major markets (high level system)*

- Brown crab production and consumption can be considered to operate as many subsystems (regional, sectoral) of varying degrees of interdependence, nested within an overarching brown crab system.
- There are at least three major subsystems:
  - Live
  - Processed, and
  - Local.

- The high level system, and major trends and drivers, is now described at a high level as follows:
  - Brown crab resource - stocks (see Activity 3)
  - Capture, landings and imports
  - Product handling and transformation; including main subsystems (see Activity 6)
  - Consumption (see other input from Activity 5), and
  - Consumers.

Brown crab resource

- Brown crab stocks are largely located in waters surrounding the UK, Rep of Ireland and north western France.
- Stocks appear to be in reasonable condition with most stocks believed to be at or above biomass limit reference points. The stock showing most concern is the North Sea. (see Activity 3)
- Most brown crab stocks are considered to be stable over time.
- Management arrangements are largely focussed on landing size. A minimum landing size (MLS) of 130-140 is in place, however the market landing size is greater than this (around 150). MLS is not activated as the only market for this size is in Asia. Beyond MLS, management arrangements vary across jurisdictions. There is a continuum for management arrangements e.g. France puts more restriction on effort but other countries do not e.g. UK cannot operate with these conditions due to the latent effort issue (see Activity 3).
- Management of brown crab resource centred on the current measures seem to protect the stock (as long as they're adhered to). However the current measures do not ensure economic sustainability.
- An important issue is the lack of effective management of the fishery across jurisdictions.

Capture, landings and imports

- The fleet profile in the UK, Rep of Ireland, and France suggests that:
    - Vessels engaged in catching brown crab is a combination of vivier and day boats.
    - Vessels tend to require high levels of capital (gear etc) to produce relatively low value volume.
- Evidence from the UK highlights differences in performance between vivier and day boats.
- Capture and landing of live crab is supported by large, dedicated, vivier vessels and by day boats that catch brown crab alongside other species.
- Landings of brown crab are concentrated in the UK, Rep of Ireland and north western France. Table 2.1 provides landings volume and value for the latest available year. Note, landings figures can be very unreliable (for example in the Rep of Ireland it is estimated that landings inshore for brown crab in 2013 was around 3,300t suggesting a total landings figure of around 8,000t)[i]

| **Table 2.1 Landings of brown crab into selected countries in 2013 - volume and value** | | |
|---|---|---|
| **COUNTRY** | **VOLUME (tonnes product weight)** | **VALUE (€)** |
| UK | 25,881 | 39,417,302 |
| Rep of Ireland | 5,745 | 8,575,990 |
| France[1] | 5,780 | 8,246,373 |
| Spain | 85 | 190,070 |
| Portugal | 1 | 2,562 |
| Netherlands | 711 | 582,528 |
| TOTAL | **38,203** | **57,014,825** |

*Source: Eurostat, 2015*

- Landings trends over several years (Annex 1) show that UK landings have fluctuated between 20,000 and 25,000t whilst in the Rep of Ireland declared landings have been consistently around 6000t[ii].
- Landings volumes and values throughout the year are subject to seasonal variation. The UK landings profile for brown crab shows volume to be relatively low and prices relatively high in the period November to April and volumes relatively high and prices relatively low in the period May to October (see Annex 2).

[1] Eurostat 2013 data suggest France landing value to be 28,246,373 which we assume is an error (on comparison with 2010 figures, suggest true figure is 8,246,373).

- There is a considerable volume of brown crab imports (Annex 3) amongst traditional market destinations (France, Spain and Portugal).
- Imports into the system (from Norway for example) appear to be a small component of brown crab supply (Annex 4). Trade data suggests in 2013 imports to EU countries totalled 420t, largely from Norway. Norwegian material is generally directed towards northern European countries (Sweden, Denmark, and Germany); the remaining volume (42t) was imported into the UK.

Product handling and transformation

- Live trade is largely supplied by vivier vessels, landing into holding tanks. Thereafter transported by vivier trucks to continental wholesalers.
- Processed trade is largely supplied by vivier and day boats, landed to processors for primary processing, and in some cases secondary processing, of products. Advanced processing takes place in the UK, basic processing in the Rep of Ireland, and very limited added value processing in France. No substantive processing is undertaken in Portugal & Spain – activities in these countries are limited to very localised operations – see next.
- Localised – very short chain systems where locally sourced brown crab is supplied to local markets. This can be due to limitations presented by basic processing and/or the ability to aggregate supplies to achieve scale economies that would make long distance transportation a viable cost.

Markets

- There is a considerable volume of brown crab export trade (Annex 3) particularly by the source countries (UK and Republic of Ireland) to the traditional market destinations (France, Spain and Portugal).
- Live – supplied by vivier trucks largely to wholesalers, retail and food service customers largely on the continent (France, Spain, Portugal):
    - Markets in France and Spain are generally static/stable.
    - Export markets in the Far East are growing (China and Hong Kong, Macao, Japan, South Korea, Indonesia, Vietnam). From practically no exports of brown crab to these countries in 2006, sales increased to nearly 1,500t in 2013 (398t of live, 1,084t of frozen).
- Processed – supplied to wholesalers, retail and food service outlets largely in the UK and Rep of Ireland
    - There are a large range of processed products available. In 2014, there were 79 products sampled, with the majority (49) of these from UK (see Activity 6).
    - Retail market in the UK is growing.
- Localised – supplied to local retail (fishmongers) and food service outlets (pubs and restaurants).

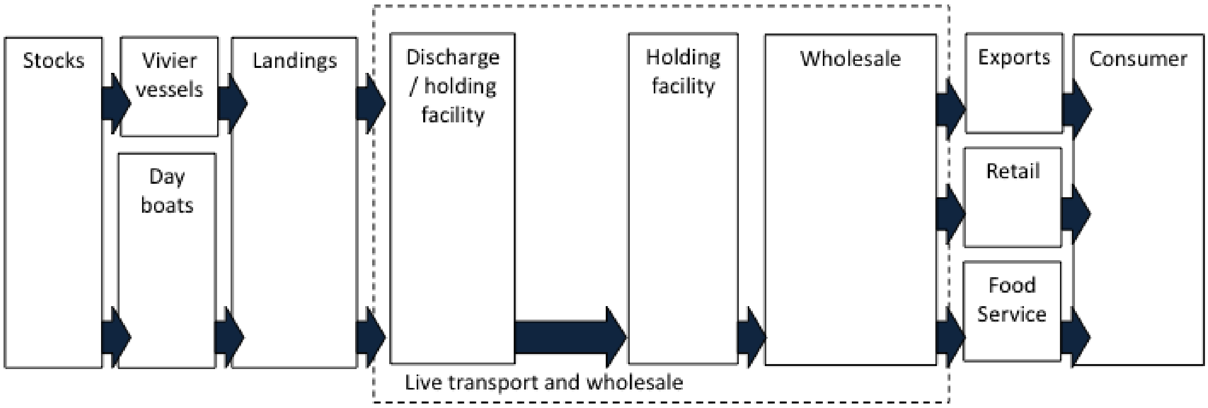
Consumers

- Brown crab is not an everyday purchase and is considered an exceptional product. The UK consumer buys brown crab very occasionally (around twice a year on average) and at any time throughout the year. On the continent brown crab consumption is more seasonal focussed on the big occasion, in France this would be June to December on occasions that warrant it (holidays) or facilitates it (the seaside).
- In broad terms there is a sharp contrast in how consumers in the UK (and potentially in the Rep of Ireland) view the brown crab proposition versus those in France, Spain and Portugal. In the UK, brown crab is seen as ‘fiddly’ with the potential to generate food sickness. On the continent this ‘fiddly’ aspect is perhaps celebrated as a redeeming feature (including a proof of freshness) to be enjoyed socially. In France for example there can be a playful dimension to buying and eating brown crab (breaking the claws, eating it with ones hands, plunging it in mayonnaise, or a special event like holidays or eating outdoors). In Spain consumers buy crab to share with others socially and celebrate special occasions (Christmas, weddings etc).

- Annual brown crab consumption is a relatively small part of overall seafood consumption. For example in France apparent consumption is around 14,000t (product weight), representing 0.6% of the French seafood market.
- Overall, consumers of brown crab are older and more affluent (UK, Rep of Ireland, France, Spain and Portugal).
- However, there are some comparisons and contrasts between younger and older consumers.
- All consumers are cost-conscious (but particularly those in the Eurozone: Portugal/Spain/France/Rep of Ireland).
- Penetration is high across both groups:
    - Younger consumers more likely to consume out of home.
    - Older consumers more likely to consume in-home.
- Frequency is low for brown crab products in both consumer groups.
- Cost is an important barrier in both consumer groups.
- "Preparation" is an important barrier for in-home consumption.
- "Knowing whether I will like it" is an important barrier for younger consumers out of home.
- Both consumer age groups share the same substitutes:
    - (Prawn) – in-home consumption, and
    - (Lobster) – out of home consumption.
- Consumer trends over several years would suggest that increased availability of convenient formats is increasing brown crab penetration. However there is a trade-off with cost and this provides limits to processed product opportunity in southern European countries, and potential opportunities in northern Europe.

## 2.3 Live system

### a. Overview




### b. Description of main activities from catch to consumer

**Capture (fleet profile), landings and imports**

- In the first half of the year vessels will tend to work to the live system, providing live crab for onward transport and wholesale.
- Demand for crab claws encourages the landing of poor quality crab for claws with the remainder (i.e. bodies) being used for whelk bait. Alternatively it encourages clawing and discarding of crab bodies at sea to avoid the minimum landing at sea (MLS) restriction.

In the Rep of Ireland:

- It is estimated that around half of all landing volumes of brown crab were for the live system in 2013; around 4,000 tonnes.
- There are relatively few vessels over 15m landing brown crab and these have been declining (from around 30 in 2008 to around 5 in 2013). This has been driven as an unintended consequence of effort controls on crab by the Western Waters agreement that capped effort of vessels over 15m (Council Regulation 1415 of 2004). This led to the loss of older vessels from the fleet (trading down a size to avoid kilowatt day restrictions), and displacement of vivier vessels unable to avoid restrictions into the North Sea crab fishery. This resulted in a substantial new fishery in the North Sea, led initially by UK vessels followed by Rep of Ireland vessels. Landings of live crab into Netherlands increased and provided a more direct connection to continental markets. However in the two years since 2012 this material has been re-directed back to the UK and Rep of Ireland as a result of weak live markets on the continent and robust demand for processed product in the UK particularly.
- Average landings by vessels over 15m (15-18m, 18-24m, >24m) have seen dramatic reductions since 2008, driven by 18-24m vessels.
- Total revenue for the over 15m segment vessels has seen a decline since 2008, particularly for 18-24m vessels. This reflects the shift in focus of remaining vessels i.e. focus on North Sea fishery.
- Intensity of crab fishing activity (average days at sea per vessel) has been highest for >24m (reaching 200 days at sea annually) and then 18-24m (rarely passing 100 days at sea annually). This compares with days typically expected for Irish inshore vessels i.e. 120-160 days
- 1,233 tonnes of fresh crab were imported in 2013, almost all from the UK.

In the UK:

- Estimated landings of brown crab to live in 2013 were around 13,000t (50% of total landings)
- Vessels of 10m and above will be dedicated to brown crab.
- In 2009, there were up to 30 UK vessels (14m-35m), handling 2,000-3,000 pots, holding live crab on board, and at sea for several weeks. Their focus is on offshore grounds (West and North of Scotland and German bight).
- Net profit is very tight (1% in 2011 for example) relative to smaller vessels (18% in 2011). The larger vessels have higher operating costs and are dedicated to brown crab so there is less opportunity for non-fishing income/income from other species. Larger vessels need to make bigger changes in times of difficulty.
- The number of vivier vessels have fluctuated recently (two 'super crabbers' moving out of crab into scallops).
- Vivier vessels can be landing 13-14 tonnes per week.
- Historically vivier vessels will have had lower overheads and crab caught will have achieved a price of €4/kg (£3.20/kg) in France/Spain. Vessels would have been constructed for a good margin. However bait and fuel costs increased dramatically and prices haven't kept pace (see section on markets).
- A small relatively small amount (50 tonnes) of fresh crab were imported in 2013, almost all from the Rep of Ireland.
- Industry estimates suggest 2,000 tonnes may be going into whelk bait at around €0.38-0.63/kg (£0.30-0.50/kg).

In France:

- Live crab is supplied by French vessels and also imported into France from UK and Rep of Ireland
- Estimated landed volume in 2013 was around 7,000t (French landings are ~6500t, foreign landings ~500t) and of this an estimated 5,770t volume is for live system (ViaAqua)
- There are 12 offshore vessels that are exclusive potters (18-24m), with an average crew of six, and a tank capacity of 14-24 tonnes.
- In 2011, there were 5 vessels landing almost half the total catch volume at auction (1,200 i.e. 50% of 2,400 tonnes).
- Landings prices of live crab are higher than in the UK (the difference in price arises as the product is nearer the market, gains from lower transport costs are reflected in the price). In the two years since 2012, the price buyers have paid fishermen has remained stable although costs have increased. In the five years from 2013, volumes and (inflation adjusted) prices of brown crab at the fish market have remained largely stable. Over a longer time period volumes and prices are decreasing.
- Imported live crab was estimated to be 4,560 tonnes in 2013 largely from the Rep of Ireland (2,430t) and the UK (2,130t).

In Spain and Portugal:

- Estimated landings volumes of brown crab in 2013 for live were 85t in Spain and 1t in Portugal.
- Catches are usually by-catches and only for live local markets (see section 2.5).
- 2,888 tonnes of fresh crab were imported into Spain in 2013, largely from the UK (2,514t)
- 1,806 tonnes of fresh crab were imported into Portugal in 2013 (estimate 49% of this was live crab). Imports originated from UK (1,406 tonnes), and France (256 tonnes). Trend shows declining imports (regardless of origin) during financial crisis period.

**Live transport and wholesale**

- Upon landing, live crab is held in captivity and aggregated where necessary in a holding facility, then transported in vivier trucks to intermediary customers (in wholesale) or final customers in retail or food service.
- Mortality in *transportation* can range from 1% in the winter periods to 5% in summer periods. However, some estimate mortality *through the chain* averages 10%.
- Where there are mortalities, claws can be directed to processing companies (with bodies directed to whelk fisheries as bait). Where live crab does not meet the requirements for certain markets (eg. Chinese markets) these rejects can be directed to processors for meat extraction.

In the Rep of Ireland:

- There are two companies handling live material all exported. All of this material is exported.
- One aggregates catches (from vivier and day boats) and the other is supplied through vivier
- There are high operating costs, high transport costs, and mortality is an issue.
- Prices are typically higher in live trade than processing. Vessels will catch for the live sector in the first six months of the year. Thereafter vessels will switch and catch to the processing sector when live prices are relatively low.

In the UK:

- In 2012 there were 10 shellfish units handling live shellfish (including brown crab), eight of which were exporting.
- Operators will draw exclusively from a vivier vessel or will aggregate live crab from day boats.
- Day boats tend to land to processors and viviers to markets. This balance depends on whether vessels are landing into England (where day boats land to processors) or Scotland (where day boats land to wholesalers).
- The live market will pay a higher price at key points in the year. At other times (e.g. December- February) the price can fall €3.75/kg (£3/kg) to €1.88/kg (£1.50/kg). So material will be sold to processors at this time.

In France:

- The transportation of live crab occurs in vivier trucks to the major wholesalers equipped with vivier tanks, via ferry lines (Roscoff, Cherbourg) and in polystyrene boxes for distributors and wholesalers who do not have such facilities, via the channel tunnel and Boulogne-sur-mer fish hub.
- Around 10,330t of live crab was traded in 2013 either by dedicated traders and distributors (~5,260t) or through processors who also carry out trading activity (~5,070t).

In Spain:

- 48 supplier companies with an average of 273 kg/day (80% of companies have live tanks (for live storage).
- Of these 48 companies, Supplier profile: SMEs (36%), Middlemen (27%), Large companies (23%), others (14%).
- Predominance of live crab in imported brown crab (77% of import volume).
- For the last six years the importers price has remained the same.
- Live material ordered weekly at an average of €3.294/kg (£2.64) per order.
- Material transported in vivier tanks. Trucks are isotherm and refrigerated with average mortality 8-15%
- Transport times by road are on average (Rep of Ireland (24-48hrs), UK (24-48h), France (12-24hrs), Gales (24-48h).

- Pricing criteria: size (69%) – see price differences in France, weight (58%), sex (27%), and meat content (21%).
- Issues include quality control at origin, reduction in transport costs, and impact of economic crisis on viability of operators.

In Portugal:

- There are 4 main wholesale operators importing live crab for retailers
- Operator supplying retail can draw on 10 tons per week

**Markets – Retail outlets**

The retail market for live crab is largely on the continent; France, Spain and Portugal, particularly.

In the Rep of Ireland:

- Very limited retail sales of live crab. General retail sales of live product stable at very low level.

In the UK:

- Limited domestic retail sales of live crab (although sales value and volume of 'fresh' crab, of which live crab will be a small component, between 2009-12 has steadily increased).

In France:

- Most sales of live crab are on the Atlantic seaboard and Paris. Live crab has more limited distribution (relative to meats) (see via Aqua 2015).
- Live crab is regularly available in hypermarkets and to a lesser extent in fishmongers.
- Live crab is widely used for cooking in fishmongers (69%) and to a much lesser extent in supermarkets (28%)
- Majority of retail sales are 'fresh' within which live crab is considered to be a significant component.
- Crab consumption is mostly seasonal (in the 2nd half of the year, peak in December).
- Over the 2007-2011 period, sales volume and value have been static, dropping in past year.
- Prices paid for live crab are much lower than cooked products and are considered to be at the right level (see via Aqua 2015)
- Price trends (combining fish market, direct sales, and import prices) remain relatively stable.
- The overall quality of live crab is considered good, however live crab quality is considered somewhat inferior compared to processed crab (cooked and claws). This is due to live crabs not always being complete, and carrying a mortality risk. However the organoleptic quality of live crab, when consumed cooked, is considered superior to processed crab (cooked).
- Live crab is considered less attractive to retail outlets as it is deemed more complicated to manage and less profitable. This is a particular issue for fishmongers who are obliged to offer it as a differential service compared to mass distribution.

In Spain:

- Live product is 48% of retail market (volume)
- Market is supplied through dedicated suppliers (buyers relying mostly on one supplier).
- Historically, over the last six or seven years, the price of material supplied has remained static.
- Market expectations: No increase in demand in forthcoming years, no increase in price.
- Crab consumption is seasonal (Christmas, summer, weekend) and this seasonality is driven by tradition.

In Portugal:

- Live product is 48% of retail market (volume) in 2012
- Seasonality throughout the year but with two peaks (summer and winter).
- Issues – Crab quality and shelf life are strongly affected by duration of captivity, transport handling and storage conditions along the chain.
- Mortalities during transport and holding.
- Operational cost (significant to holding facilities)

**Markets – Food Service**

The food service market for live crab is generally limited, confined to specialised outlets, largely on the continent; France, Spain and Portugal particularly.

In the Rep of Ireland:

- Limited food service market (not a main feature – would rely on cooked products)
- Unlikely a meaningful opportunity.

In the UK:

- Live crab is not a main feature in food service with supply largely in processed form.
- Unlikely a meaningful opportunity

In France:

- Brown crab is rarely available and not a main feature in food service. Availability is restricted to specialised fish restaurants, particularly high end restaurants that do not use ready-to-eat products. (ViaAqua 2015)
- However, live crab is generally the format of supply (processed product being a minority).
- Price trends (combining fish market, direct sales, and import prices) remain stable if not increasing.
- The overall quality of live crab is considered satisfactory, being undermined by the mortality risk live crab carries. The organoleptic quality of live crab, when consumed cooked, is considered superior to processed crab (cooked).

In Spain:

- Live crab not a main feature in food service (most food service require processed material).
- Live crab is a niche feature in food service (specific restaurants only)
- Availability of processed products is also limited (see below)

In Portugal:

- Live crab not a main feature in food service (most food service require processed material)
- Live crab is a niche feature in food service (specific restaurants only)

**Markets (exports)**

Export destinations for major producing countries (UK and Rep of Ireland) are continental markets (France, Spain and Portugal) and fast growing Far East markets.

From the Rep of Ireland:

- 2,656 tonnes of fresh crab was exported in 2013.
- The main export focus is France, small volumes to China
- Historically, live landings will have been transported to France by ferry, however in recent years there have been direct landings into Netherlands as this is easier for onward live transportation.
- More recently, landings into Netherlands have been shipped to France, but also back to Rep of Ireland for processing or small volumes by air freight to China.

From the UK:

- 6,796 tonnes of fresh crab was exported in 2013.
- In the wake of Dungeness crab, which has been exported to the Far East for several years, exports of brown crab to the Far East have increased dramatically in recent years. The 'live' component of this export trade will be for Chinese food service.
- Live market in the Far East (beyond China i.e. Taiwan, Singapore etc) cannot be met with existing supplies.
- China interested in live brown crab and in large female (hen) crabs. The live crab market in China is all year, but significantly increasing demand in January/February (for Chinese New Year).
- Chinese growth has been driven by live (growing demand for high quality live crab). Chinese preferences are visual (size based); rejections do not mean poor quality brown crab.
- European customers unwilling, or unable, to raise prices to counter.
- Market in China has exploded quickly with very strict quality control on size and quality. Material falling short of quality requirements is diverted to processing.
- There are still growth opportunities for live brown crab in China. However, China is very selective and has recently suspended trade of brown crab from the UK. If trade recommences material to this market will reduce material available to European markets.
- The volume of live crab sold to France and then on to consumer as live product is now probably less than that directed to the processed chain (live crab transformed to a cooked product).

From France:

- Approximately 1,200t of live crab are exported to Italy, Portugal, Spain, China.

From Spain:

- 71 tonnes of fresh crab was exported in 2013.
- With limited domestic catch, this export trade relies largely on imported material.
- Main target market is Portugal (76% of exports in volume).
- China is becoming a potential market; exports to start by 2015.

From Portugal:

- 17 tonnes of fresh crab was exported in 2013.
- With limited domestic catch, this export trade relies largely on imported material.

**Consumers**

Across all markets both the younger aged consumers (18-35 years) and older aged consumers (35-50 years) showed the least interest in eating whole live crab (Acrunet Q9).

In the UK and Rep of Ireland:

- Consumer interest in live crab scores lower than consumers in Spain and France. In the UK, there is a very limited market except for areas with an historical maritime link.

In France & Spain:

- Consumer interest in live crab scores higher than UK & Rep of Ireland.
- In France, live crab is attractive for its 'guarantee of freshness and quality' (especially when in vivier tanks). Live crab is more popular amongst heavy consumers of brown crab, who tend to be over 50 years of age and consuming crab at least three times per year, purchasing for in-home consumption. Live crab is less appealing to light consumers who consume crab less than twice a year, purchasing primarily out of home (avoiding the complexity of preparation (barriers to buying include very limited knowledge about how to cook it at home (see via Aqua, 2015).
- In France, live or cooked crab remains the preferred product for consumers in both age brackets (under 35 years, 35-50 years) but the preference, and the attractiveness of live crab in a vivier tank at a fish stall in particular, is more marked for consumers in the 35-50 year age group.
- In France, purchasing factors are powerfully shaped by the product image. Live crab is a raw product which benefits from a very strong image and appearance. Factors include; price and quality (intensity, smell, date of capture) then origin (France), assurance of wild product, size (as a guarantee of meat content) and appearance (colour, hardness of carapace, presence of claws).

In Portugal:

- 56% of retail purchases are live crab.
- Consumer interest in live crab scores quite low amongst 18-35 year olds.
- Purchasing factors for live crab are: liveliness (64%), gender (62%), size (51%), aspect (48%), and price (40%).

In the Far East:

- Anecdotally it is expected that the number of consumers in the requisite salary band for purchasing western seafood will shift from the current 1.5 million consumers to 1.5 billion in the next 15 years.

**c. Barriers & issues**

| | |
|---|---|
| Vessel, transport & wholesale | • Transportation and wholesaling of live crab suffers from a number of disadvantages: quality control and transport costs (Spain) and captivity duration, transport handling and storage conditions in the chain affecting crab quality, shelf life and mortality (Portugal & Spain) |
| Markets | • Live crab suffers from availability and seasonality issues (Portugal/France/Spain). In general seasonality does not fit the market requirement (material is available when not required, whilst material is required when not available) and there is not a mechanism for smoothing this fluctuation. It is difficult to hold tonnage for very long, beyond a few weeks.<br>o Mismatch between crab condition and peaks in demand e.g. In summer high demand the crab is in poor quality. High demand in October onwards forces suppliers to provide lower quality material. If this seasonal demand is to be broken then a strategy is needed to achieve this.<br>o Interruptions in supply-demand due to climate conditions and demand peaks. This affects 42% of companies (Spain). In France, live crab can only be sold in high season or during holidays or weekends. New players e.g. China may aggravate the above mismatch in supply-demand |

| | |
|---|---|
| | • **In France**, retailers highlight a number of disadvantages with live crab: short shelf life, mortality, and greater inconsistency of live crab, and labour costs for cooking it at the selling point (France). The low quality is mainly due to brown crabs not always being well filled in the shell. Hypermarkets (and restaurants) are sensitive to the vulnerability of live crabs. Cooked crab is more expensive but taking into account the mortality risk of live crab (and the filling hazards) makes cooked crab very competitive. The price is perceived rather as a handicap even if it is generally acknowledged that value for money is good. Preparation and shelling at home are a handicap for selling. Filling problems, mortality and preparation risks favour the development of cooked crab and claws for distribution.<br>o There is a downward trend in live crab in favour of more convenience products (eg cooked crab). The final cost of live crab is higher than that of other (pre-cooked) product formats despite a more attractive initial purchase price of live crab than cooked crab. This is due to the disadvantages of live crab.<br>o Brown crab generates relatively little turnover for retail and can appear complex to manage (due to disadvantages). In food service distribution is restricted to specialised fish restaurants. |
| | • **In China** there are regulatory requirements in most major ports. This is specifically highlighted on the cadmium issue, which has led to a ban on supplies from the UK (timeframe for resolution unknown as of mid 2015). |
| Consumer | • **In France**, the attractiveness to ‘light’ consumers of live crab is undermined by the limited knowledge about how to cook it at home – and this may be removed by cooking in store (see via Aqua, 2015). |

**d. Opportunities and threats**

- **Opportunities:**

| | |
|---|---|
| Vessels, transport and wholesale | • Lower oil price may alleviate high operating costs for vessels and wholesalers |
| Markets | • The vivier equipment required for live crab is widespread in France. Based on a sample survey, 40% of fishmongers and hypermarkets, and 30% of restaurants that cook crab. |
| | • Growing demand for very high quality live crab in Far East (China and Hong Kong, Vietnam, Japan, Thailand) (UK, Acrunet).<br>• With Dungeness crab exported for several years, brown crab is easy enough to get into Far East markets.<br>• The significant demand for brown crab from the Chinese market occurs in a period of weaker demand in Europe. |
| Consumers | • Attractiveness of live crab in France particularly amongst heavy consumers (see viaAqua, 2015). |
| | • Capitalise on product image and aspects of live crab considered superior (organoleptic aspects, authenticity) on the part of continental consumers. |
| | • Ageing population and their predisposition to live crab may sustain the live market in the longer term.<br>• The growth in the number of Far East consumers that can afford western seafood products could drive up prices for live brown crab. |

- **Threats:**

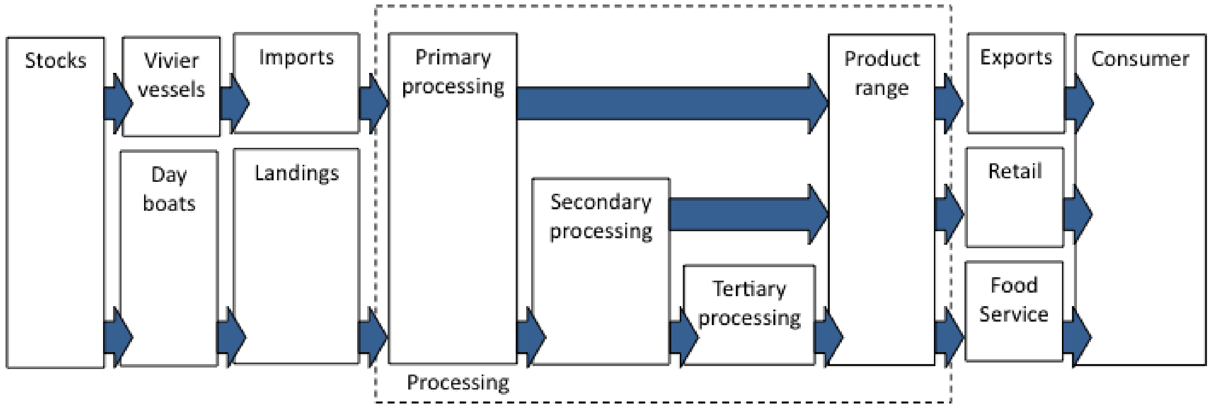
| | |
|---|---|
| Fishery management | • Optimum value is not being extracted from the brown crab resource |
| | • Latent effort an issue for UK and Rep of Ireland. Potential for increase in fishing effort through activation of latent effort in the UK and Rep of Ireland – resolution of this issue is required for effective fishery management. |
| Vessels | • Clawing undermines the value of the resource. Clawing strategies in the processing sector could result in weakening of the available stocks for the live market. |
| | • Peaks in continental demand are at odds with catch period (seasonality). |
| | • No objective measure of quality. Can only select at source and quality only measured by visual inspection (UK). |
| Vessels, transport & wholesale | • Economic conditions challenging operator viability (rather than changes in the market). |
| | • Operators geared towards high volumes (tight margins and relatively fixed assets dedicated to brown crab) are exposed to key cost factors (oil price, sales prices and mortality issues through the chain). |
| | • Lack of innovation in live transportation – even in the last ten years exporting has been under the same transport conditions. Low price/return environment creates inertia in finding a practical solution that will be willingly adopted (industry have investments in existing assets). |
| Markets | • Live market in Europe is considered 'mature', not expected to grow but rather to remain a limited/static market. |
| | • Availability of supplies to continental markets may suffer. Lower volume, lower quality crab may be available as a result of Chinese demand. Supplies may also be curtailed as the growth of processing in the UK absorbs material. |
| Consumers | • Level of cadmium, other contaminants are under investigation<br>• Animal welfare in transport and holding (including nicking) |

**e. Suggested actions**

- In Europe:
    - Challenge seasonality in continental markets.
    - Communicate mortality and cost profile back to the catching sector and forwards to the consumer.
    - Explore bonding as an alternative to nicking (Acrunet II)
- In the Far East:
    - Markets short of Dungeness crab will be open to brown crab i.e. brown crab becomes the substitute for existing crab markets (a new study for Acrunet II).

### 2.4. Processed system

#### a. Overview




#### b. Description of main activities from catch to consumer

**Capture (fleet profile), landings and imports**

- In general smaller vessels without vivier tanks will land into the processed market as they are unable to maintain the condition of the animals for the live customer. Some smaller vessels will supply to the live market but this is a minority.
- In the second half of the year vessels will tend to work to the processed system, providing live crab for cooking and meat extraction.

In the Rep of Ireland:

- It is estimated that around half of all landing volumes of brown crab were for the processed system in 2013; around 4,000 tonnes.
- The majority of vessels landing brown crab are smaller sized vessels (under 15m) and these numbers increased dramatically from 2005 where there were around 30 vessels to 2008 where there were around 120 vessels (10-12m vessel numbers increased particularly).
- This relates to the cap in effort highlighted earlier, where vessels have switched to smaller length.
- Total revenue for under 15m vessel segment has remained relatively flat between 2005 and 2013.
- Intensity of crab fishing activity (average days at sea per vessel) amongst smaller vessels is an average 50 days at sea annually.
- Imported frozen crab was estimated to be 92 tonnes in 2013, largely from the UK.

In the UK:

- Estimated landings of brown crab to live in 2013 were around 12,800t
- Vessels under 10m will land brown crab as by-catch.
- In 2009, a large proportion (80%) of the 3,700 vessels licenced to fish with pots in the UK & Rep of Ireland were under 10m. Over the period 2006-10, around 1,000 vessels have been actively fishing. (See Activity 3)
- In 2009, under 10 m vessels, on average handled 500-1,500 pots and worked inshore grounds on a daily basis.

- Net profit (18% in 2011) is higher for under 10m vessels relative to vivier vessels (1% in 2011). They can benefit from non-fishing income, and much lower operating costs (including fuel) and diversity of target species (e.g. lobster).
- Most day boats land to processors, although some will aggregate and land to vivier trucks.
- Day boats tend to operate as crofter/artisanal operations.
- Small boats prices haven't been good (crab only has one outlet – it has to go to processing) and they've had to cope with substantial increases in bait and fuel costs.
- This is leading to smarter fishing (only when they can fish an entire day) as well as riskier fishing (increasingly fishing as individuals) in some locations (on the West coast of Scotland for example).
- Small vessels are vulnerable to external interference (eg Marine Conservation Zones, wind farms etc) and other fishing vessels (vivier vessels, and the influx of small vessels from other sectors/areas).
- It is easier to move into or out of the small scale sector, so displacement and part-time fishing (which can lead to gear conflict) are substantial issues demanding better management. (See Activity 3)
- A number of vessels in other sectors (e.g. Whitefish fleet) have shellfish licences so there's potential for overcapacity (if prices increase) – the variation in the landing price can be as much as £0.40/kg.
- Imported frozen crab was estimated to be 112 tonnes in 2013 largely from the Rep of Ireland (54 tonnes) and Norway (42 tonnes).

In France:

- Brown crab for processing is supplied by French vessels and also imported mainly fresh from Rep of Ireland, UK and from Norway in frozen format; the proportion of French origin material of much less significance.
- In 2011, around 70 smaller vessels specialised in brown crab (i.e. where brown crab represented over 10% of their turnover).
- Around 18 smaller vessels (under 18m) target brown crab.
- Catch is seasonal (spring and summer).
- French landings (French and foreign vessels) destined for processing were estimated to be 3,700t in 2013.
- Imported material for processors was estimated to be 7,655t in 2013 largely from Rep of Ireland (3,800t), UK (3,600t) and Norway (255t)

In Spain and Portugal:

- Catches are usually by-catches and only for live local markets (see section 2.5).
- Imported frozen crab into Spain was estimated to be 881 tonnes in 2013 largely from the Rep of Ireland (426 tonnes) and the UK (418 tonnes).
- Imports of frozen product to Portugal was 696t in 2012 (estimated 51% of whole imports of brown crab). This material originated from UK (426 tonnes), Rep of Ireland (192 tonnes), and Spain (73 tonnes).

**Processing**

- Processors are often referred to as 'cookers'. Crab is cooked (pasteurised) by processors in the country of origin and may be followed with further stages of processing which – depending on the product and supply chain - may involve freezing, defrost and further cooking.
- Processing operations range from a basic level (primary processing) to a sophisticated level (secondary and tertiary processing). For example:
    - Primary processing (from cooked whole, claws, to dressed crab)
    - Secondary processing (shelled products from white, brown and mixed meats – fresh, frozen and pasteurised - to canned)

    - Tertiary processing (crab as an ingredient in another product including pates, paste, crab cakes).
- High demand for claws drives landing of poor quality crab, unsustainable fishing practices (clawing undersized crabs), and the sale of remaining brown crab to whelk fishery as bait. (It is roughly estimated that the volume of brown crab bodies directed to whelk bait could be around 2,000t in the Rep of Ireland, and as much as 4,000t in the UK. With claws being 20% of the animal, this could be driving the supply of 1,500t of claws.

In the Rep of Ireland:

- There are a small number of major processors, regionally spread. Five major processors are: Errigal Bay, Atlanfish, Shellfish Ireland, Sofrimar, and Connemara Seafoods. Errigal Bay and Atlanfish being the largest.
- Brown crab is central to some processing operation, but less so for others (brown crab share of turnover ranges from 17-86%). Where brown crab is not central then the alternative species can be wide ranging including other shellfish and whitefish.
- There are high operating costs and high transport costs.
- Meat extraction in Rep of Ireland is limited because it is costly and labour intensive.
- Processing is mainly primary with little value added or new product development.

In the UK:

- In 2012 there were six large shellfish processing units handling brown crab employing over 50 FTEs. There are five key processing companies, with a considerable number of smaller 'cottage industry' processors (especially on the East coast).
- Crab products are almost exclusively traded as cooked product. Canning is in very small volumes.
- There are two types of processing operation, those accepting brown crab:
    - for 3-4 months per year (to produce whole, vacuum packed, crab)
    - all year (but shift focus across whole, vacuum packed, crab for 3-4 months).
- All processors would like to receive live crab at the door.

In France:

- Processing is regionally concentrated in the North West region and of limited scale.
- The majority of processing is concerned with primary processing. More than 75% of sales volumes involve the entire crab, the rest is claws. Around 12 companies are engaged in this activity.
- The range of processing is limited focussed on cooked parts (claws, legs, etc). Crab tends to be frozen, then cooked again before being sold as a whole fresh cooked crab.
- There are high volumes of whole crab cooked in Brittany that is then distributed through France.
- Primary processing suffers from lack of capacity (more craft/artisanal than industrial scale when compared to UK, Rep of Ireland, Norway etc), dependence on imports (given French vessels focus to live crab), uncertain quality (cheap products, poor quality) and weak sales price (closer to promotional price than average price)
- Whole vacuum packed crab (with full roe) is processed on a seasonal basis (September to December)
- Secondary processing, on an industrial scale, is non-existent. Meat production is conducted in the UK, Rep of Ireland, and Norway. In picked meat, white meat goes to industry for flavouring and texture in subsequent products, rather than for sale in retail (as is done in the UK).
- Tertiary processing is undertaken to a limited extent by 3 or 4 large operators (and a number of very small specialised companies). Reflecting the extent of secondary processing, no brown crab meat is drawn from French production.
- Tertiary processing suffers from the lack of French origin meat, and meat being of unsatisfactory quality.

In Spain:

- In the context of the overall seafood category, brown crab has marginal relevance to operators.
- There is limited processing of brown crab, mainly primary processing (frozen cooked whole).
- Processed products are considered to be low quality reflecting a fundamental principle in the market that 'the more cooked, the worse the product' due to the fact that these products use material that fail the first market sale (live crab).
- Most of the companies import the brown crab already processed (this will become all companies if Pescanova are no longer active in brown crab).
- Delicrab companies have significant variations in terms of quality.
- Processed crab meat is not yet popular.
- Some companies offer other seafood meat in place of brown crab eg availability of surimi products consumers believe is brown crab.  This makes it difficult to introduce brown crab product at correct price (as effectively this is competing with surimi type products).

In Portugal:

- There is limited processing of brown crab, with just three small processing units.  Focussed on primary processing (whole cooked crab) for 3-4 months of year, storing and selling throughout year largely to retail, small volumes to food service.  One unit produces whole cooked crab, and brown and white meat products.  The unit has a capacity to freeze 50 tonnes of material in 3 months.  However, due to insufficient material availability, the unit operates at 35 tonnes.  Huge variability in the quality (not a good experience for consumers).

**Markets – Retail**

The retail market for processed products is most advanced in the UK and to a lesser extent Rep of Ireland and France.  Overall, there is a wide range of brown crab products available in retail outlets (79 products sampled by Activity 6).

In the Rep of Ireland:

- Limited retail sales of processed crab products, this is gradually increasing with increased availability

In the UK:

- The majority of crab retail sales are processed products, chilled and ambient mainly with a minority of frozen product.  Brown meat represents a large share of the chilled sector.
- Crab sales are relatively stable over the year, but December is a key month for fresh crab.
- In the three years 2012-2014, the volume and value of chilled crab has grown steadily (whilst other formats have fluctuated). In this period the chilled category has seen 29% and 14% growth in value and volume respectively.
- Retail growth may mean product is short which, in turn, may create pressure for substitution.

In France:

- Primary processed products show a regular presence in supermarkets and fishmongers.
- Majority of retail sales are 'fresh', within which processed products are considered to take a minor share.
- Claws sold over the stall are amongst the most successful brown crab products in retail.
- Supermarkets prefer to offer primary product rather than manage the complexity of cooking live crab for the customer (as fishmongers also offer).  Secondary processed product (crab meat) is not very

widespread, almost none in supermarkets and fewer than 50% of fishmongers where it is used primarily for carrying out catered food preparation. Virtually no tertiary product is sold through fishmongers.

- The availability of products is higher than in Spain and Portugal (18 products assessed in Activity 6)
- Alongside primary processed products, the seafood platter is a highly-demanded classic in retail, with which brown crab is often associated for its good value for money. 90% of supermarkets and fishmongers offer this product.
- Crab consumption is mostly seasonal (in the 2nd half of the year, peak in December).
- Over the 2007-2011 period, sales volume and value have been static, dropping in 2012.
- Prices paid for primary processed products are much higher than live and considered to be at the right level. Cooked crab is more expensive but given the mortality risk of live crab (and the filling hazards), makes the product very competitive. In contrast prices for claws and crab meat are considered high. Price trends remain relatively stable particularly for cooked meat.
- The overall quality of primary processed products is considered good and somewhat better than live crab (given the disadvantages of live crab).
- In terms of the attractiveness of meat based products, interest appears subdued. Where there is interest there is consensus around *100% natural fresh brown crab meat* compared to the general development of ready-to-eat products (shrimp, whelk etc). This product would be suited to the self-service counter in supermarkets and benefit from French or Breton origin. Appropriately priced at €60-70/kg (£48-56/kg), this would be acceptable for a good quality product, superior to preserved meat. There is lower interest in tertiary processed products; these would have to compete with generic crab products already on the market and it is difficult to differentiate and add value to them with just a single ingredient in a recipe (i.e. using brown crab instead of just crab). In supermarkets, a fine food counter would be more legitimate than the self-service counter.

In Spain:

- Highly processed, convenience seafood is uncommon
- Of the share of processed products, a minority are brown crab products:
    - ready cooked fresh (20%)
    - ready cooked frozen (9%)
    - limbs and pates (5%)
- The shift to processed products is slow. Mercadona, the leading retail outlet in Spain, removed their fish, meat and fruit counters expecting a shift amongst consumers towards processed products. After five years they had to revert to counters due to consumers retaining interest in counter sales through other outlets.
- The procurement criterion for sourcing processed product is focussed on *price*.
- There is limited shelf space available for processed products (compared to supermarkets in the UK and France)
- Logistics infrastructure to support chilled products is limited (infrastructure is oriented towards frozen products).

In Portugal:

- Availability of processed product is stable throughout the year but prices will vary (higher at Christmas and summer reflecting increased demand). Mainly sold through supermarkets as part of broader seafood offer.
- Processed product with either vacuum or modified atmosphere packaging is available in retail outlets in very small quantities.

**Markets – Food Service**

Overall the availability of processed brown crab in food service appears limited across all partner countries. Products are likely to be confined to specialised seafood outlets or top end restaurants.

In the Rep of Ireland:

- Limited food service market (absorbs most of domestic processed product)
- Presence in food service may act as a driver to retail sales.

In the UK:

- Crab products are expected to be entirely cooked and picked meat.
- Crabcake is a key product format.
- Crab consistently sits at 2% of total out of home seafood servings.
- Over 2011 and 2012 out of home seafood servings were increasingly sold through Quick Service Restaurants.
- Recent decline in food service sales may be due to more stringent restrictions and clarification on supposed 'brown crab' products (arising from horse meat issue).
- The scale of food service brown crab sales is poorly estimated. One estimate suggests value could be 20% of retail market (Nielsen data suggests annual retail sales value for brown crab were £20.5m in March 2015).
- Food service penetration seems very low.

In France:

- Brown crab is rarely available and not a main feature in food service. Availability is restricted to specialised fish restaurants, particularly high end restaurants that do not use ready-to-eat products. (ViaAqua 2015)
- Processed product is a minority of supply to food service outlets (live crab is the format of supply generally)
- Food service market very small: 570t and €3.2m (£2.6m) in 2011.
- Many restaurants (50% surveyed) extract the meat themselves for the needs of their menu. This practice is considered costly in terms of labour costs (10 to 15 mn per crab). There is no alternative for dishes with whole brown crab when it is presented shelled. For crab meat-based recipes, the trend is for replacement with imported fresh meat (extracted manually). This is either very competitive in terms of quality, or on the contrary qualitatively far from the meat extracted at the restaurant.
- The seafood platter is a leading product offer in restaurants providing brown crab, others include whole crab, crab claws, and crab-based dishes (ravioli, fritters, cakes, gratins). The latter are amongst the most successful products.
- In terms of the attractiveness of meat based products, there is greater level of interest than in retail although still appears subdued. Where there is interest there is consensus around *100% natural fresh brown crab meat*. There is a niche for a high-quality product aimed at high-end restaurants (compared to a fairly average supply) having French origin. There is no interest in tertiary processed products amongst high-end restaurants which do not use ready to eat products. There may be interest amongst mid-range restaurants due to the convenience of ready-to-eat products (however this is constrained by the difficulty of adding value to this target in relation to the preparation of generic crab).

In Spain:

- Small market with low penetration

- Majority of food service outlets are reliant on processed material (extracted meat)
- Extracted meat may also come from substitute species

In Portugal:

- Small market with low penetration
- Majority of food service outlets are reliant on processed material (extracted meat)
- Extracted meat may also come from substitute species

**Markets (exports)**

Export destinations for major product manufacturing countries (UK, Rep of Ireland) are to continental markets and particularly to northern Europe and fast growing Far East markets.

From the Rep of Ireland:

- 3,921 tonnes of frozen crab was exported in 2013.
- Bulk of primary processed product will be exported (primarily to France/Spain/Portugal/Scandinavia), secondary processed tend to be for the domestic market.
- The Swedish market for processed whole crab (with full roe), relying on a late summer crab, was established by the Irish processors in the 1980s. This market is now supplied by Irish processors but also suppliers from Norway.

From the UK:

- 2,663 tonnes of frozen crab was exported in 2013.
- Continental markets appear to be moving towards processed products; more so in the northern continental markets and slow movement in southern markets over the long term.
- French and Spanish export markets are static.
- Brown crab markets in Italy and Portugal traditionally sourced through France but this is happening less (material is increasingly sourced directly from producing countries).
- China is a growing export market, relevant for whole cooked crab. The Chinese market has protected the sales of vac-packed primary products in the face of the downturn in European markets.
- Exports to other developed countries, such as North America, emphasise convenience.

From France:

- 24 tonnes of frozen crab was exported in 2013. Amongst others, this material was destined for Portugal (6 tonnes), Norway (4 tonnes), and Italy (3 tonnes).
- With limited processing activity, there is limited exporting of processed brown crab product.

From Spain:

- 74 tonnes of frozen crab was exported in 2013. Amongst others this material was destined for Portugal (46 tonnes), France (6 tonnes), and Hong Kong (4 tonnes).
- With limited processing activity, there is limited exporting of products. There are small volumes re-exported to Portugal (primarily for food service markets)

From Portugal:

- Exported frozen product was 39 tonnes in 2013. Amongst other this material was destined for Switzerland (12 tonnes), Germany (3.5 tonnes), US (3.4 tonnes, Spain (1.3 tonnes).

- With limited processing activity, there is limited exporting of products. There are small volumes, mainly exported to Switzerland and Germany.

**Consumers**

- Across all markets both the younger aged consumers (18-35 years) and older aged consumers (35-50 years) showed interest in consuming crab products in the future, albeit as a niche product (Acrunet Q9).
- Products receiving greatest level of interest were *crab meat as part of a meal or starter* (Acrunet Q9).
- Consumers, regardless of country, are seeking products that are easy to use (and prepare) and are shell free (Acrunet).

In the UK and Rep of Ireland:

- For those in the UK buying for in-home consumption, crab is more likely to be bought by those with the following characteristics: AB social classes, one or two member households, households with no children present (including 'empty nesters' and retired), households where the housewife is 55+, with a regional bias to London. Crab is almost twice as likely to be eaten by wealthy families who can afford to spend on fresh fish, and least likely by those who only eat frozen fish (due to a limited budget) or rarely eat fish (typically students and young professionals). The bias to London is revealed in fresh crab, with a quarter of fresh purchases (this is same share of purchases as 'North of England'). In contrast London only accounts for 8% of frozen purchases (whilst the 'North of England' accounts for 57%).
- The UK consumer profile will depend on the crab product. For example crab pate/spreads (older/affluent consumers), crab linguine (younger/affluent consumers), canned crab (older/less affluent consumers), crab cakes (younger / less affluent consumers).
- In the UK, since the mid-1970s consumers have moved towards increasingly processed products e.g. from live crab to boiled crab to dressed crab etc.
- Consumer interest in processed product amongst younger group is highest in UK compared to Rep of Ireland, France, Spain and Portugal (Acrunet).

In France & Spain:

- Consumer interest in processed product amongst the older consumer group is highest in France, Spain (Acrunet). In the French market evidence suggests product convenience is important. In Spain, this is likely to be because these consumers believe they are eating crab when, in fact, they are eating substitutes i.e. surimi as crab sticks.
- In France
    - Brown crab is in the 'squeezed middle' i.e. losing out to a low cost available substitute (crab sticks/surimi) and a high value premium product (snow and king crab). Consumers appear to be selecting premium products occasionally sustained by a low cost substitute at other times.
    - Most sales of whole are in the Atlantic coast and Paris, whilst sales of cooked products are concentrated in Easter and Christmas.
    - Processed products are attractive for their convenience and practicality. Cooked crab, including within a seafood platter, is particularly attractive due to its advantages of being ready to eat and having a festive dimension. These products appeal to consumers, who may not know how to prepare brown crab nor feel like learning how to, for whom the cooking of the live animal can be especially off-putting, and for whom arduous shelling (demanded by certain recipes) can spoil the pleasure of preparing brown crab. Processed products provide an alternative option; ready to eat cooked products can make cooked brown crab, claws and the seafood platter successful dishes for in-home consumption. Preserved crab meat, is lauded for its practicality but criticised

for its quality. Further still, there are ready-made preparations (such as potted crab) however these are quite distant from the original brown crab.
    - Cooked crab is more popular amongst heavy consumers of brown crab (who tend to be over 50 years of age and consuming crab at least three times per year, purchasing for in-home consumption) than with light consumers (who consume crab less than twice a year). The latter have a preference for the seafood platter. Fresh meat is noted by both heavy and light consumers. Meat-based products that are 100% meat, fresh or preserved, are highly rated by heavy consumers (particularly preserved meat which is seen as an additional convenience product rather than a substitute product) and light consumers (particularly fresh crab meat which is a real alternative to brown crab which is complicated for these consumers).
    - Cooked crab (alongside live) remains the preferred product for consumers in both age brackets (under 35 years, 35-50 years) but the preference, and the attractiveness of cooked crab and fresh meat, is more marked for consumers in the under 35 year age group. This younger age group better appreciate meat-based products including value-added products like potted crab. The older age group is more likely to feel satisfied with traditional supply and that nothing needs to be changed.
    - Purchasing factors are powerfully shaped by the product image. In contrast with live crab, brown crab derivative products have become part of the fast moving consumer good bracket. This integrates them with the purchases of products for volume consumption, involving a highly standardised purchasing process.
- In Spain:
    - Consumers purchase brown crab on a seasonal basis, linked to certain periods like Christmas. Those consuming whole brown crab also eat brown meat, but consumers tend to associate processed products with low quality.
    - Consumers are concerned with flavour and brown crab forming the mainstay of the product; highly processed food tends to be rejected. Consumers are less concerned with purchasing for convenience and more concerned with purchasing food to consume socially.
    - There is a preference for simple and affordable products with preferences based on price, appearance, organoleptic and visual aspects, and presentation. There is an expected increase in the consumption of processed products (60%) alongside an expectation of no increase in price (90%). Have expected this increase for 15 years – a very slow tendency towards processed product.

In Portugal:

- Purchasing factors for frozen processed crab are: shelf life (73%), presentation (76%), price (54%), and brand (14%).
- Consumers of whole brown crab also eat the brown meat.

**c. Barriers & issues**

| | |
|---|---|
| Fishery management | • Lack of effective resource management (UK, Rep of Ireland). |
| Processing | • High operating costs may lead to lack of demand and closure of processing facilities (Rep of Ireland). |
| | • Investment climate may frustrate innovation (high cost low return environment?) |
| | • Limited capacity for processing in France, Spain and Portugal. In France there is limited capacity in processing particularly secondary and tertiary processed products. |
| | • Lack of clarity on opportunity for secondary processed product (e.g. is this opportunity restricted to established players?) |
| | • Lack of finance for new product development (Rep of Ireland). |

| | |
|---|---|
| | • Imports for Portugal and Spain - supplies are reliant on imported extracted meat but also small volumes of meat arise from mortalities in the live system (this drives variability in quality of products to outlets in retail and food service) |
| Markets | • Lack of raw material for growing markets, (UK, Rep of Ireland).<br>• **In the UK:**<br>• Brown crab in food service is undermined by shelf life difficulties (generating waste) a mismatch between chef skills and available product formats. An appropriate level of processing is required, with very basic products and highly processed products unlikely to be acceptable in the food service sector. |
| | • Limited markets in continental markets (France, Spain, Portugal) and it is difficult to convert market opportunities into increased sales. |
| | • **In France:**<br>• Processed products are undermined by a dependence on imported material (non-French origin), and uncertain quality.<br>• There is no real expectation of new products, with the majority of professionals satisfied with existing supply. Besides vacuum pack, there has not been any breakthrough innovation by industry suggesting the industry is rather more 'market-following' rather than 'market-making'.<br>• Supply remains insufficient to stimulate the market because it does not respond sufficiently to the practical needs of potential brown crab customers. Convenience is missing. |
| | • There are risks and entry barriers for processed products in continental markets.<br>• **In Spain** a range of initial market entry barriers exist for advanced processed products available in the UK. Important barriers relate to the perception of low quality crab and an expectation of low prices for processed products in Spain. Beyond this, barriers for UK products also include: high prices, limited shelf space and short shelf life; complex logistics, and appropriate packaging (including text suited to the Spanish market).<br>• **In France** the attractiveness of crab meat based products is mixed. A level of disinterest and price expectations (considered to be at the right level, or quite high in the case of claws) would suggest a risk of small volumes. |
| Consumer | • **In the UK**, brown crab is seen as 'fiddly' so the consumer needs support, there is also the occasional fear of food sickness.<br>• The prevailing product image held by the continental consumer could impede market entry for processed products<br>• **In Spain** processed products are associated with low quality/low cost items.<br>• **In France** processed products are amongst fast moving consumer goods). There is dissatisfaction on the part of consumers in terms of practicality of brown crab products, availability of meat-based product on self-service counters and, dissatisfaction for restaurants in the quality of meat-based products. |

**d. Opportunities and threats**

- **Opportunities:**

| | |
|---|---|
| Processing | • Improving the quality of processed products – to remove variability. |
| | • Rejections from certain live markets (eg China) can be a source of material for meat extraction. |
| | • There are different opportunity sets for processed products that have different levels of risk and return. For example primary processed product offers a higher revenue and lower risks than live (live has higher risks, higher costs than processed) although requires a significant capital investment. Secondary processing may offer higher returns for limited additional investment. Therefore opportunities for 'new entrants' are different to those for established operators. |

| | |
|---|---|
| | • Secondary processed demand unlikely to decline (unlike live or primary). |
| Markets | • **In the UK**, the retail market requires continued innovation and investment. The food service opportunity lies in more mainstream restaurants, as current format does not fit their needs. Outlets currently supplying brown crab are reasonably well served. |
| | • There are niche market opportunities for high quality, secondary processed products in France, Spain, and Portugal. Opportunities are emphasised as some competing suppliers to these markets (eg Norway) are struggling to secure enough material for their home market).<br>• **In Spain**, this applies particularly to the premium retail sector in Spain and products from the UK, if price points can be achieved (UK products are of a comparable quality to fresh products). There are opportunities to alert Spanish consumers to the quality of processed products, to provide raw material for processing companies in Spain, and to explore other conservation formats (canned).<br>• **In France**, there are opportunities to expand secondary processed product; fresh brown crab meat with 100% or a high meat content in order to address impracticalities of brown crab and the difficulties faced by preserved crab meat. There is potential to offer brown crab that is easier to consume under the form of prepared meals (however not to the extent that the product is spoiled through too much processing or through becoming an everyday product). Tertiary processors also show an interest in the supply of quality secondary processed brown crab (with a source).<br>• The potential for whole cooked crab in the Far East remains huge, and there are still opportunities to diversify into these markets. |
| Consumers | • In continental markets, there are:<br>o potential new markets for processed crab product (younger and older consumers); particularly in the north but also in the south in the longer term.<br>o opportunities to challenge perception of processed products as low quality options. |

- **Threats:**

| | |
|---|---|
| Vessels | • Vessels may not maintain current effort levels. For example, high demand for claws may drive unsustainable fishing practices (poor quality crab) |
| Processing | • Alternative providers of processed crab or ‘crab type’ products (Norwegian processors, substitute species). |
| | • Live market rejections can be source material, but there is no cost-recovery in empty crab.<br>• Growth in the Far East live market could absorb material currently available to processing. |
| | • Vessels clawing and discarding bodies at sea to avoid the minimum landing at sea (MLS) restriction leads to a poor quality product; this undermines the value of the ‘true’ claw product. |
| Markets | • The increase in consumption of processed products may be a slow development, and may fail to materialise (particularly in the face of prevailing product image). |
| | • Traditional markets for primary processed products in France/Spain/Portugal are mature (stable/declining/unlikely to grow). |
| | • Financial crash has stalled southern European market potential for processed product |
| | • Availability of material for fast growing markets and also seasonality. |
| | • Robust UK retail growth may mean product is short (diverting material from other markets e.g. live crab to France) and potentially creating pressure for substitution |
| Consumers | • Brown crab products associated with brands and brand value can be more exposed to negative perceptions of brown crab generated in media. This is of particular relevance to the UK but may be a growing threat in other countries. |
| | • Lack of consumer demand due to high costs. |
| | • Disconnect of consumer knowing what they are paying higher costs for (eg. brown |

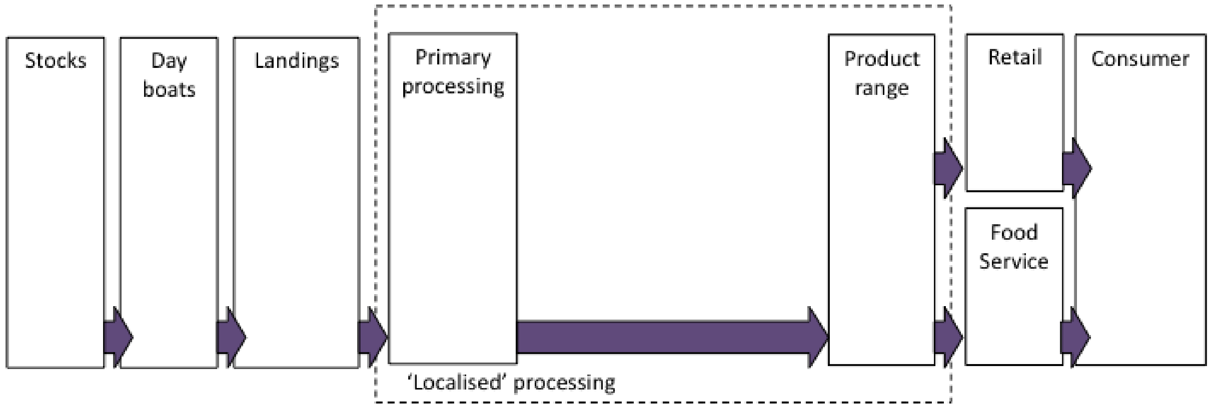
| | |
|---|---|
| | crab versus surimi). |
| | • In France, Spain and Portugal,<br>• There is a cultural requirement to see the whole animal and associate live crab with high quality, and processed product with low quality.<br>• As consumers of whole brown crab also eat the brown meat the risk of cadmium is potentially significant. |

**e. Suggested actions**

- In Europe
  - Put in place a brown crab ambassador to convert market opportunities
  - Establish a formal inter-branch organisation that can formalise Producer Organisation type activity for brown crab.
  - Explore alternative whelk bait that would reduce demands for brown crab material (eg. green crab)
  - Review the potential for a dedicated compliance officer monitoring brown crab (this may not be effective at the catching stage – as it is too wide / too broad - but may be effective in monitoring the distribution of claws).
  - Estimate the volume of brown crab bodies being directed to whelk bait (low value meat). Understand the impact this low value market has on the claw market.
  - Identify / develop a brown crab brand to cope with competitor products.
  - Provide accompanying marketing messages that highlight how processed products can be as good as fresh in European retail sectors.
  - Protect the brown crab industry by actively managing industry reputation, particularly around clawing and cadmium.
- In the Far East
  - Continue to develop the markets for primary and secondary processed products
  - Protect the brown crab import-export trade by actively managing industry reputation, particularly around the issue of cadmium.

## 2.5. Local system

### a. Overview




Peripheral areas have less opportunity to aggregate material to send processed product to market. In addition, logistics barriers can lead to higher clawing practices.

### b. Description of main activities from catch to consumer

**Capture**

In the UK and Rep of Ireland

- Port areas that are home to brown crab vessels, particularly smaller vessels, support regional markets around the UK coast (e.g Northern Ireland, West of Scotland, Wales, Southern and Eastern England) and to a lesser extent around the coast of the Rep of Ireland (eg. Atlantic coast).

France, Spain and Portugal

- In France, vessels landing into the North West region support an important regional market
- In Spain, the brown crab fishery is very small (85 tonnes in 2012). Landings by these vessels are largely as by-catch and, although volumes are probably underestimated, they remain low. Supplies are only 5% of the Spanish domestic market (95% of supplies come from UK & France).
- In Portugal, the brown crab fishery is very small (8 tonnes in 2009, 1 tonne in 2010). Landings by these vessels are largely as by-catch and, although volumes are probably underestimated, they remain low.

**Processing**

- Processing, if undertaken at all, is restricted to primary processing.

**Retail and food service**

- These are localised, confined to small retail (fishmongers) and food service outlets (pubs and restaurants). In the UK, London is an important additional market for small volumes of niche product (especially for those operating in the South West, South and South East coastal areas).

**Consumers**

- Tourists and the local population are the main consumer group.
- Consumers associate this product with holidays and the seaside (e.g. France).

## 3. General conclusions and recommendations

### 3.1. High level interactions

- There are a number of higher level interactions between crab systems, and interactions between stages of production, as well as longer term developments that affect the production and consumption of brown crab.

**Crab interactions: Major dynamic between subsystems (live and processed).**

- Practices in processing operations (clawing) could undermine supply base for live operators as well as other processed products.
    - Clawing of undersized crab affects stock (undermines fishery controls and the wider sustainability of the fishery)
    - Clawing of poor quality crab (whiteface) – lessens the value extracted from the stock, undermines industry reputation.
    - Interaction between crab fisheries and whelk fisheries (large vessels, for example, supplying crab bodies to whelk bait market) can have negative consequences for the brown crab industry. The practice can reduce the economic yield from the crab fishery and also weaken the stock through disease (Haematodinium). This disease is spread through the use of crab bodies as bait and if consumed infected crab will taste bitter.
- Material transfer from the 'live' system is redirected to the processed system. This can be due to a number of factors, for example when:
    - Material is unsuitable at the catching stage, live crab is directed to processors for meat extraction.
    - There are mortalities in live transportation this can, in some instances, be redirected for meat extraction.
    - Material does not meet the requirements of the live market eg, China's requirement for specific crab size
    - Market prices for live crab are insufficient vis-à-vis market prices for processed products.
- The relatively weak live market in Europe is leading to a wider movement towards the processed market and also a search for other outlets for brown crab. Alternative outlets largely centre on Far East markets; this is not restricted to China, but also Hong Kong, Japan, South Korea, Indonesia, and Vietnam. Operators that service these markets may also be reliant on processed markets (that can also absorb the crab that does not meet the Far East requirements).

**Interactions between stages of production**

- There is weak connection between market opportunities (China, processed products etc) and effective management of the resource.

**Higher level developments affecting the industry.**

- These include longer term environmental changes (climate change creating uncertainty over future distribution as well as other changes as observed with other species), economic conditions (affecting ability to purchase, exchange rates – affecting trade, financing – affecting operations), availability of alternative species (global availability affecting substitutes, and brown crab being a very small part of the seafood category), and food security (growing population, concern over contaminants, nutritional value).

### 3.2. High level opportunities and threats

- Overall
  - Opportunity – maximising the value of the resource (not landing poor quality crab)
  - Threat – increased market demand leads to overexploitation
- Live
  - Opportunities - New markets for producing countries present attractive options to suppliers. There are opportunities to reduce transport costs (through alternative transport options)
  - Threats – Traditional live markets in Europe may have supply undermined.
- Processed
  - Opportunities - Niche markets for high quality processed crab product
  - Threats - Alternative providers of high quality processed crab or 'crab type' products (Norwegian processors, substitutes)

### 3.3. Potential orientation for the next five years

- **Live:** *Protect European and secure Far East markets*
- **Processed:** *Maintain Far East markets for primary, develop secondary (meat based) products in selected European markets and in Far East.*

### 3.4. Recommended action

- Industry
  - Industry-wide transnational co-operation is required on management of the resource.
  - Produce an industry code of practice which includes an item on clawing practices. A policy action is required to ban the use of crab as bait. These actions would address clawing of poor quality crab (whiteface) that, in turn, lessens the value extracted from the stock, and undermines industry reputation.
  - Promote consumption of crab through different marketing strategies.
  - Develop a communication strategy to inform consumers of the brown crab products they are eating. This would address the communications disconnect for those consumers not knowing what they are eating (brown crab processed product or substitute crab product) and why they are paying higher costs for brown crab. This could include improved product packaging and labelling as well as guidance to consumers on how to culinary treat brown crab (e.g. recipes/presentation formats for making the brown crab even more appealing on the consumers' dish).
  - Actively manage brown crab reputation given potential negative messages in the face of consumers and end customers. In doing so, develop consistent messages on the part of the brown crab industry on issues such as cadmium and clawing etc.
  - Provide clear industry intelligence in order to clarify options for growth e.g. trade-offs between live and processed (product price points for example). These actions would address the disconnect between market opportunities (e.g. China, processed products etc) and effective management of the resource.
- Policy
  - Introduce a minimum landing size for claws to address clawing of undersized crab (a practice that, in turn, affects brown crab stocks by undermining fishery controls).

Some of the above industry actions can be undertaken within national boundaries, others will require concerted action, through an ongoing Acrunet type network or specific initiative (Acrunet II).

**Sources**

- Industry interviews 2013
- National brown crab profiles (slide decks), 2013 (UK, Rep of Ireland, France, Spain, Portugal)
- Industry meetings in UK, Spain, Portugal, and Rep of Ireland
- Acrunet meetings 2013-2015. London (February 2013), Paris (June 2013), Vigo (October 2013), Edinburgh (March 2014), Lisbon (June 2014), Bristol (October 2014), Dublin (March 2015), and Roscoff (June 2015).
- Market research: Consumer perceptions of processed products in selected European markets 2014
- Market research: Brown crab trade perspectives on processed products in selected European markets 2015
- Market analysis for the Irish brown crab fishery, 2014 – Curtin Economic consultancy Ltd
- Study of the brown crab supply chain in France, 2015 - ViaAqua
- Acrunet trade survey 2014-15.

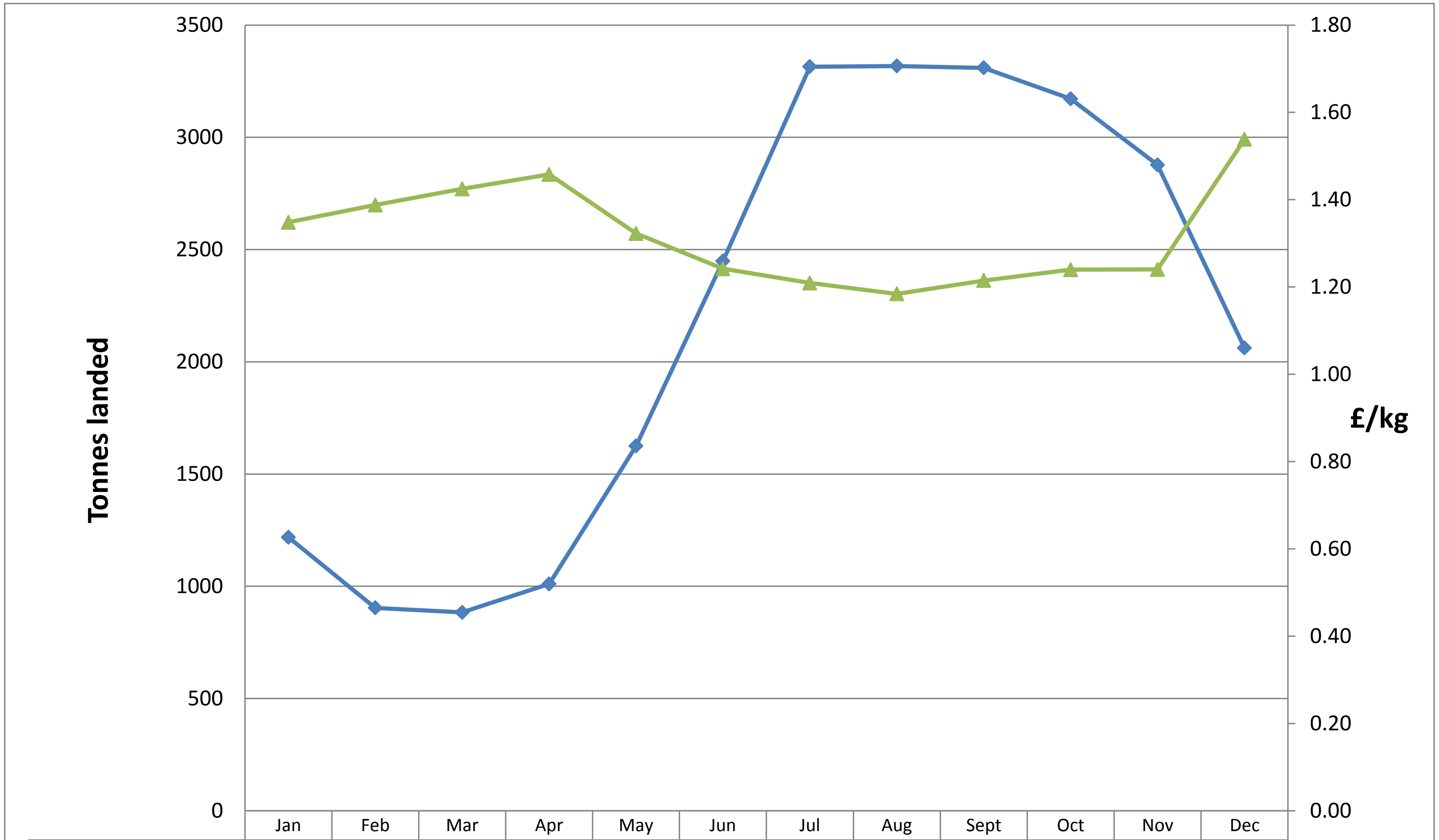
**Annex 1**

| VOLUME (TONNES) | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UK | 20,050 | 14,494 | 10,958 | 12,997 | 23,472 | 20,521 | 21,043 | 22,691 | 24,372 | 25,630 | 25,881 |
| Rep of Ireland | unavailable | 11,523 | 6,018 | 9,821 | 32,601 | 6,450 | 4,582 | 6,706 | 5,314 | 6,075 | 5,745 |
| France | 6,140 | 5,555 | 4,028 | 3,227 | 4,001 | 4,538 | 4,532 | 4,315 | 6,239 | 6,176 | 5,780 |
| Spain | 52 | 66 | 93 | 99 | 115 | 108 | 76 | 73 | 70 | 85 | 85 |
| Portugal | 14 | 13 | 13 | 7 | 5 | 6 | 8 | 1 | 1 | 1 | 1 |
| Netherlands | unavailable | unavailable | unavailable | unavailable | 2,381 | 2,307 | 2,050 | 1,922 | 2,194 | 977 | 711 |
| TOTAL | unavailable | **31,651** | **21,110** | **26,151** | **62,575** | **33,930** | **32,291** | **35,707** | **38,190** | **38,944** | **38,203** |
| Norway | 4,972 | 5,251 | 5,676 | 6,211 | 8,510 | 5,280 | 4,970 | 5,714 | 5,317 | 4,981 | unavailable |
| TOTAL (Inc Norway) | unavailable | unavailable | unavailable | unavailable | 68,704 | 36,903 | 35,211 | 39,499 | 41,313 | 42,948 | unavailable |
| TOTAL EEA (EU-25 plus IS, LI, NOR) | | | | | | 39,918 | 37,547 | | | | unavailable |

| VALUE (EURO) | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| UK | 29,982,286 | 23,547,883 | 16,541,719 | 25,356,967 | 43,615,590 | 31,729,049 | 27,055,596 | 31,178,450 | 34,424,387 | 39,130,321 | 39,417,302 |
| Rep of Ireland | unavailable | 9,900,787 | 5,935,847 | 12,529,709 | 56,412,502 | 10,189,452 | 5,909,448 | 8,834,764 | 7,354,071 | 8,790,589 | 8,575,990 |
| France* | 17,141,641 | 15,170,277 | 9,724,993 | 7,922,611 | 9,739,738 | 12,179,528 | 9,106,325 | 8,010,676 | 14,511,513 | 14,715,468 | 8,246,373 |
| Spain | 140,551 | 174,417 | 368,069 | 371,136 | 326,799 | 360,663 | 245,681 | 281,541 | 185,199 | 207,134 | 190,070 |
| Portugal | 21,701 | 22,359 | 21,345 | 18,518 | 20,612 | 21,318 | 18,090 | 2,352 | 3,530 | 2,380 | 2,562 |
| Netherlands | unavailable | unavailable | unavailable | unavailable | unavailable | 5,022,774 | 5,168,302 | 5,657,779 | 1,415,506 | 737,514 | 582,528 |
| **TOTAL** | unavailable | **48,815,723** | **32,591,973** | **46,198,941** | **110,115,241** | **59,502,784** | **47,503,442** | **53,965,562** | **57,894,206** | **63,583,406** | **57,014,825** |
| Norway | 4,960,165 | 4,913,224 | 5,599,410 | 6,240,121 | 8,618,569 | 5,114,992 | 4,615,212 | 5,807,559 | 5,789,541 | 6,247,835 | unavailable |
| TOTAL (Inc Norway) | unavailable | 53,728,947 | 38,191,383 | 52,439,062 | 118,733,810 | 59,595,002 | 46,950,352 | 54,115,342 | 62,268,241 | 69,093,727 | unavailable |
| TOTAL EEA (EU-25 plus IS, LI, NOR) | | | | | | 65,787,466 | 54,946,771 | | | | unavailable |

***Table A1.1. Landings of brown crab in selected European countries 2003-2013 (Eurostat, 2015)***

**Annex 2**




| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Live Weight (tonnes) | 1219 | 904 | 884 | 1011 | 1625 | 2449 | 3315 | 3318 | 3309 | 3172 | 2878 | 2061 |
| £/kg | 1.35 | 1.39 | 1.42 | 1.46 | 1.32 | 1.24 | 1.21 | 1.18 | 1.21 | 1.24 | 1.24 | 1.54 |

***Fig. A2.1 Landings of brown crab into UK, 2013 (live weight). Source IFISH system, Marine Management Organisation. UK***

## Annex 3

| Brown crab import vols (t) | 2007 | | | 2008 | | | 2009 | | | 2010 | | | 2011 | | | 2012 | | | 2013 | | | 2014 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total |
| Portugal (EU28 extra) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| Portugal (EU28 intra) | 2,508 | 944.3 | 3,452 | 2,278 | 1396.1 | 3,674 | 2,371 | 1664.8 | 4,035 | 2,091 | 982.7 | 3,073 | 1,875 | 715.4 | 2,591 | 1,715 | 754.1 | 2,469 | 1,806 | 695.2 | 2,502 | 1,939 | 1045.1 | 2,984 |
| **Portugal total** | **2,508** | **944** | **3,452** | **2,278** | **1,396** | **3,674** | **2,371** | **1,666** | **4,036** | **2,091** | **983** | **3,073** | **1,875** | **715** | **2,591** | **1,715** | **754** | **2,469** | **1,806** | **696** | **2,502** | **1,939** | **1,045** | **2,984** |
| Spain (EU28 Extra 28) | 0 | 29 | 29 | 0 | 14 | 14 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spain (EU28 Intra 28) | 4,828 | 1,187 | 6,015 | 4,895 | 991 | 5,885 | 4,344 | 974 | 5,318 | 4,458 | 1,181 | 5,639 | 4,352 | 1,059 | 5,411 | 3,575 | 611 | 4,185 | 2,888 | 881 | 3,770 | 2,933 | 950 | 3,883 |
| **Spain total** | **4,828** | **1,216** | **6,044** | **4,895** | **1,005** | **5,900** | **4,344** | **976** | **5,320** | **4,458** | **1,181** | **5,639** | **4,352** | **1,059** | **5,411** | **3,575** | **611** | **4,185** | **2,888** | **881** | **3,770** | **2,933** | **950** | **3,883** |
| France (EU28 extra) | 0 | 20 | 20 | 65 | 18 | 83 | 171 | 7 | 178 | 226 | 15 | 240 | 149 | 0 | 149 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| France (EU28 intra) | 6,130 | 3,251 | 9,381 | 5,868 | 2,447 | 8,315 | 6,621 | 1,862 | 8,483 | 6,166 | 1,752 | 7,918 | 5,957 | 1,677 | 7,634 | 5,893 | 1,895 | 7,788 | 5,805 | 1,794 | 7,599 | 5,581 | 1,950 | 7,531 |
| **France total** | **6,130** | **3,271** | **9,401** | **5,933** | **2,465** | **8,398** | **6,792** | **1,869** | **8,661** | **6,392** | **1,767** | **8,159** | **6,106** | **1,678** | **7,784** | **5,893** | **1,895** | **7,789** | **5,806** | **1,794** | **7,600** | **5,581** | **1,950** | **7,532** |
| UK (EU28 extra) | 48 | 112 | 160 | 27 | 11 | 38 | 19 | 50 | 68 | 1 | 207 | 208 | 1 | 179 | 180 | 0 | 80 | 81 | 0 | 45 | 45 | 0 | 4 | 4 |
| UK (EU28 intra) | 131 | 144 | 275 | 195 | 57 | 251 | 227 | 54 | 280 | 290 | 66 | 357 | 275 | 78 | 353 | 56 | 84 | 140 | 50 | 68 | 118 | 561 | 74 | 635 |
| **UK total** | **179** | **256** | **435** | **222** | **68** | **290** | **245** | **103** | **348** | **291** | **273** | **565** | **276** | **257** | **533** | **57** | **164** | **221** | **50** | **112** | **162** | **561** | **78** | **639** |
| ROI (EU28 extra) | 8 | 0 | 8 | 0 | 0 | 0 | 0 | 40 | 40 | 0 | 309 | 309 | 0 | 70 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ROI (EU28 intra) | 1,355 | 441 | 1,796 | 727 | 371 | 1,098 | 1,208 | 472 | 1,681 | 1,386 | 259 | 1,645 | 1,054 | 201 | 1,255 | 1,736 | 78 | 1,814 | 1,251 | 92 | 1,343 | 584 | 59 | 644 |
| **ROI total** | **1,363** | **441** | **1,804** | **727** | **371** | **1,098** | **1,208** | **512** | **1,721** | **1,386** | **568** | **1,954** | **1,054** | **271** | **1,325** | **1,736** | **78** | **1,814** | **1,251** | **92** | **1,343** | **584** | **59** | **644** |

| Brown crab export vols (t) | 2007 | | | 2008 | | | 2009 | | | 2010 | | | 2011 | | | 2012 | | | 2013 | | | 2014 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total | Fresh | Frozen | Total |
| Portugal (EU28 extra) | 3 | 6 | 9 | 4 | 9 | 14 | 4 | 5 | 9 | 4 | 5 | 9 | 5 | 20 | 24 | 17 | 21 | 38 | 17 | 30 | 48 | 19 | 23 | 42 |
| Portugal (EU28 intra) | 9 | 17 | 26 | 1 | 17 | 18 | 11 | 32 | 44 | 0 | 12 | 12 | 1 | 21 | 22 | 0 | 14 | 14 | 0 | 8 | 8 | 0 | 23 | 23 |
| **Portugal total** | **12** | **23** | **35** | **5** | **26** | **31** | **15** | **38** | **53** | **5** | **17** | **21** | **5** | **41** | **46** | **17** | **35** | **52** | **17** | **39** | **56** | **19** | **46** | **65** |
| Spain (EU28 Extra 28) | 9 | 7 | 16 | 5 | 5 | 9 | 5 | 4 | 9 | 0 | 3 | 3 | 0 | 11 | 11 | 2 | 16 | 18 | 4 | 16 | 20 | 0 | 12 | 13 |
| Spain (EU28 Intra 28) | 174 | 97 | 271 | 114 | 59 | 173 | 70 | 123 | 193 | 75 | 96 | 171 | 97 | 92 | 189 | 78 | 83 | 161 | 67 | 58 | 126 | 95 | 74 | 168 |
| **Spain total** | **183** | **104** | **287** | **119** | **64** | **183** | **75** | **126** | **202** | **75** | **99** | **175** | **97** | **102** | **200** | **80** | **99** | **179** | **71** | **74** | **145** | **95** | **86** | **181** |
| France (EU28 extra) | 3 | 2 | 5 | 3 | 23 | 25 | 4 | 2 | 5 | 5 | 2 | 8 | 5 | 11 | 15 | 108 | 5 | 113 | 151 | 8 | 159 | 115 | 7 | 121 |
| France (EU28 intra) | 386 | 386 | 772 | 431 | 431 | 861 | 168 | 168 | 335 | 118 | 118 | 237 | 71 | 71 | 142 | 6 | 6 | 12 | 16 | 16 | 33 | 14 | 14 | 29 |
| **France total** | **390** | **388** | **778** | **433** | **453** | **886** | **171** | **169** | **341** | **124** | **121** | **244** | **76** | **82** | **158** | **114** | **11** | **125** | **167** | **24** | **191** | **129** | **21** | **150** |
| UK (EU28 extra) | 0 | 84 | 84 | 1 | 164 | 164 | | 178 | 178 | 97 | 148 | 245 | 277 | 231 | 507 | 193 | 493 | 687 | 252 | 612 | 864 | 635 | 935 | 1,570 |
| UK (EU28 intra) | 5,955 | 1,896 | 7,851 | 6,085 | 1,136 | 7,221 | 6,869 | 1,217 | 8,086 | 7,727 | 2,007 | 9,735 | 7,120 | 1,819 | 8,939 | 5,986 | 2,131 | 8,117 | 6,544 | 2,051 | 8,595 | 5,895 | 2,839 | 8,733 |
| **UK total** | **5,955** | **1,980** | **7,935** | **6,086** | **1,299** | **7,385** | **6,869** | **1,396** | **8,264** | **7,824** | **2,155** | **9,980** | **7,397** | **2,049** | **9,446** | **6,180** | **2,624** | **8,803** | **6,796** | **2,663** | **9,459** | **6,530** | **3,773** | **10,303** |
| ROI (EU28 extra) | | 273 | 273 | | 162 | 162 | | 176 | 176 | | 390 | 390 | 1 | 261 | 262 | | 394 | 394 | 3 | 574 | 576 | 50 | 357 | 407 |
| ROI (EU28 intra) | 3,364 | 3,936 | 7,300 | 3,113 | 2,567 | 5,680 | 2,738 | 3,199 | 5,937 | 2,789 | 3,450 | 6,239 | 2,774 | 3,218 | 5,992 | 2,707 | 3,580 | 6,287 | 2,653 | 3,348 | 6,001 | 2,216 | 3,608 | 5,823 |
| **ROI total** | **3,364** | **4,210** | **7,573** | **3,113** | **2,729** | **5,842** | **2,738** | **3,375** | **6,113** | **2,789** | **3,840** | **6,629** | **2,775** | **3,479** | **6,254** | **2,707** | **3,974** | **6,681** | **2,656** | **3,921** | **6,577** | **2,266** | **3,965** | **6,231** |

***Table A3.1.Import and export volumes of brown crab in selected European countries 2007-2014 (Eurostat, 2015)***

## Annex 4

| | 2000 | | | | 2006 | | | | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Brown Crab | | Other crab | | Brown Crab | | Other crab | | Brown Crab | | Other crab | | Brown Crab | | Other crab | | Brown Crab | | Other crab | |
| | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live |
| Total imports to Europe (from Norway, China, USA, Canada) | 401.8 | 58.9 | 0 | 0 | 1342.9 | 123.1 | 0 | 81.4 | 673.3 | 59.2 | 0 | 66.2 | 486.6 | 41.3 | 0 | 44.3 | 375.9 | 42 | 0 | 43.3 |
| To Northern EU countries (Sweden, Finland, Germany, Denmark, Netherlands) | 259.5 | 58.6 | 0 | 0 | 1179 | 123.1 | 0 | 66.3 | 445.3 | 59.2 | 0 | 32.9 | 417.6 | 41.3 | 0 | 15.2 | 333.8 | 42 | 0 | 7.4 |
| To Acrunet countries | 141.8 | 0 | 0 | 0 | 163.8 | 0 | 0 | 12.5 | 228 | 0 | 0 | 25.7 | 69 | 0 | 0 | 9.2 | 42.1 | 0 | 0 | 10.3 |
| *UK* | *140.8* | *0* | *0* | *0* | *158.8* | *0* | *0* | *12* | *157.6* | *0* | *0* | *12.1* | *69* | *0* | *0* | *9* | *42.1* | *0* | *0* | *9.8* |
| *RoI* | *0* | *0* | *0* | *0* | *5* | *0* | *0* | *0* | *70.4* | *0* | *0* | *12.5* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* |
| *France* | *0.7* | *0* | *0* | *0* | *0* | *0* | *0* | *0.4* | *0* | *0* | *0* | *1.1* | *0* | *0* | *0* | *0.2* | *0* | *0* | *0* | *0.5* |
| *Spain* | *0.3* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* |
| *Portugal* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0.1* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* |

**Table A4.1 Imports of brown crab from Norway, China, USA and Canada to selected European countries, 2000, 2006, 2011, 2012 and 2013 (Tonnes volume, source: Eurostat, 2015).**

| | 2000 | | | | 2006 | | | | 2011 | | | | 2012 | | | | 2013 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Brown Crab | | Other crab | | Brown Crab | | Other crab | | Brown Crab | | Other crab | | Brown Crab | | Other crab | | Brown Crab | | Other crab | |
| | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live | Frozen | Live |
| Total exports from Europe (to Norway, China, USA, Canada) | 64.2 | 2.4 | 0 | 0 | 14.5 | 9.7 | 0 | 0 | 124 | 280.5 | 0 | 0 | 482.9 | 297.8 | 0 | 0 | 623.1 | 367 | 0 | 0 |
| From Northern EU countries (Sweden, Finland, Germany, Denmark, Netherlands) | 0 | 1.1 | 0 | 0 | 4.5 | 6.5 | 0 | 0 | 0.2 | 4.7 | 0 | 0 | 0.3 | 13.3 | 0 | 0 | 2.3 | 2.8 | 0 | 0 |
| From Acrunet countries | 64.2 | 1.3 | 0 | 0 | 9.6 | 3.2 | 0 | 0 | 123.8 | 275.8 | 0 | 0 | 482.6 | 284.5 | 0 | 0 | 620.8 | 364 | 0 | 0 |
| *UK* | *64.2* | *1.3* | *0* | *0* | *9.6* | *0* | *0* | *0* | *67.1* | *270.4* | *0* | *0* | *414.9* | *175.4* | *0* | *0* | *312.8* | *213.3* | *0* | *0* |
| *RoI* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *43.2* | *1* | *0* | *0* | *61.1* | *0* | *0* | *0* | *299.2* | *1.1* | *0* | *0* |
| *France* | *0* | *0* | *0* | *0* | *0* | *0.7* | *0* | *0* | *8.2* | *0* | *0* | *0* | *0* | *104.3* | *0* | *0* | *5.4* | *144.7* | *0* | *0* |
| *Spain* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *0* | *4* | *0* | *0* | *0* | *2.9* | *0* | *0* | *0* | *0* | *0* | *0* | *0* |
| *Portugal* | *0* | *0* | *0* | *0* | *0* | *2.5* | *0* | *0* | *1.3* | *4.4* | *0* | *0* | *3.7* | *4.8* | *0* | *0* | *3.4* | *4.9* | *0* | *0* |

**Table A4.2 Exports of brown crab to Norway, China, USA and Canada from selected European countries, 2000, 2006, 2011, 2012 and 2013 (Tonnes volume, source: Eurostat, 2015).**

| FROZEN | 2000 | 2006 | 2013 | 2014 | % change 2000-2006 | % change 2006-2014 | % change 2006-2013 |
|---|---|---|---|---|---|---|---|
| Frozen Cancer Pagurus | 72 | 35 | 1084 | 1232 | -51% | 3381% | 2963% |
| Frozen Crab | 25 | 180 | 180 | 178 | 620% | -1% | 0% |
| Frozen Paralithodes camchaticus and others | 152 | 815 | 815 | 1899 | 437% | 133% | 0% |
| Total | 249 | 1031 | 2079 | 3309 | | | |
| % Cancer Pagurus over total | 29% | 3% | 52% | 37% | | | |
| **FRESH** | **2000** | **2006** | **2013** | **2014** | **% change 2000-2006** | **% change 2006-2014** | **% change 2006-2013** |
| Fresh Cancer Pagurus | 29.4 | 1.8 | 398.1 | 1256 | -94% | 69678% | 22017% |
| Fresh Crab | 0 | 0.9 | 38.8 | 87.1 | | | |
| Total | 29.4 | 2.7 | 436.9 | 1343.1 | | | |
| % Cancer Pagurus over total | 100% | 67% | 91% | 94% | | | |

**Table A4.3 EU exports of crabs to the Far East Countries (China and Hong Kong, Macao, Japan, South Korea, Indonesia, Vietnam) 2000, 2006, 2013, and 2014 (Tonnes volume, source: Eurostat, 2015).**

---

[i] Data refers to landed volumes (product weight i.e. landed weight) and value sourced from Eurostat (http://ec.europa.eu/eurostat/web/fisheries/data/database) accessed 05/02/15

[ii] Data drawn from UK and foreign vessels landings by UK port and UK vessel landings abroad 2009-2013 sourced from MMO and taken from the IFISH data system.