

WP5 - Developing social  
acceptability methods

Action 1 - Current state of the difficulties

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# Report of the Social Acceptance of Aquaculture Activities

## State of the Play

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**Deliverable:** Inventory of EU Initiatives carried out at the European and International level, aiming at improving social acceptance of economic phenomena and activities with proven results that have potential to be adapted to the aquaculture activities and territories

**Author(s):** Eurídice Cristo; Susana Imaginário

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**WP Leader:** University of Algarve (UALg)

**Contact:** [cria@ualg.pt](mailto:cria@ualg.pt)

	Name	Partner	Date	
<b>From</b>	Alexandra Marques	UALg	20/7/2020	
<b>Reviewed by</b>		All Partners	30/10/2020	
<b>Approved by</b>		CEEI Cadiz	20/11/2020	

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## DISCLAIMER

This document has been produced in the context of the Access2Sea Project “New Opportunities for more competitive and sustainable blue growth in the Atlantic Area”.

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## Contents

1. Introduction .....	7
2. Aquaculture in the world – Facts and perspectives .....	8
3. Country Profile .....	11
3.1. Portugal .....	11
Aquaculture Production .....	11
Market Structure and Consumption Profile .....	12
3.2. Spain .....	13
Aquaculture Production .....	13
Market Structure and Consumption Profile .....	13
3.3. France .....	14
Aquaculture Production .....	14
Market Structure and Consumption Profile .....	15
3.4. Ireland .....	16
Aquaculture Production .....	16
Market Structure and Consumption Profile .....	17
3.5. United Kingdom .....	17
Aquaculture Production .....	17
Market Structure and Consumption Profile .....	18
4. How can aquaculture activities be beneficent for... ..	19
4.1. Sustaining employment and livelihoods .....	19
Portugal .....	19
Spain .....	20
France .....	21
Ireland .....	22
United Kingdom .....	23
4.2. Enhancing edible supplies of seafood .....	25
Portugal .....	25
Spain .....	25
France .....	26

Ireland .....	26
United Kingdom .....	27
4.3. Contributing to national tax revenue .....	28
Portugal .....	28
Spain .....	28
France .....	29
Ireland .....	29
United Kingdom .....	29
5. How can aquaculture activities be beneficent for... ..	31
5.1. Minimising pollution and water quality impacts .....	31
Portugal .....	31
Spain .....	31
France .....	32
Ireland .....	33
United Kingdom .....	33
5.2. Minimising visual intrusion and landscape impacts .....	34
Portugal .....	34
Spain .....	34
France .....	35
Ireland .....	36
United Kingdom .....	37
5.3. Minimising impact on natural seafood stocks .....	37
Portugal .....	37
Spain .....	38
France .....	38
Ireland .....	39
United Kingdom .....	40
6. SWOT Analysis: Aquaculture social acceptance (By Country/Region) .....	42
6.1. Strengths .....	42
Portugal .....	42
Spain .....	42

France .....	42
Ireland .....	43
United Kingdom .....	43
6.2. Weaknesses .....	43
Portugal .....	43
Spain .....	44
France .....	44
Ireland .....	44
United Kingdom .....	45
6.3. Opportunities .....	45
Portugal .....	45
Spain .....	45
France .....	46
Ireland .....	46
United Kingdom .....	46
6.4. Threats .....	46
Portugal .....	46
Spain .....	47
France .....	47
Ireland .....	48
United Kingdom .....	48
7. Methodologies used for collecting information .....	49
Portugal .....	49
Spain .....	49
France .....	50
Ireland .....	52
United Kingdom .....	53

## Figures

Figure 1. Portugal: Aquaculture Production (tonnes) & Value (€) .....	11
Figure 2. Portugal: Sourcing of aquatic food .....	12
Figure 3. Spain: Aquaculture Production (tonnes) & Value (€) .....	13
Figure 4. France: Aquaculture Production (tonnes) & Value (€) .....	14
Figure 5. Ireland: Aquaculture Production (tonnes) & Value (€) .....	16
Figure 6. United Kingdom: Aquaculture Production (tonnes) & Value (€) .....	17
Figure 9. Spain: Companies, Employment and Turnover per employee .....	20



## 1. Introduction

The objective of this report is to present an overview of the current state of play regarding the social acceptance of aquaculture activities.

This report is structured in 7 chapters, including Introduction, the Chapter 1.

Chapter 2 presents current information about the importance of aquaculture in the world today and some misconceptions that the general consumer has about this sector

Chapter 3, entitled “Country Profile”, intends to present the state-of-the art of Aquaculture concerning both production and consumption (Market Structure and consumption profile) in the Access2Sea Partner Countries: Portugal, Spain, France, Ireland, Portugal and United Kingdom.

Chapter 4 is about the benefits of aquaculture activities for sustaining employment and livelihoods, enhancing edible supplies of seafood and contributing to national tax revenue, in each of the 6 Partner Countries.

Chapter 5 presents the benefits of aquaculture activities for minimising pollution and water quality impacts, minimising visual intrusion and landscape impacts, in each of the 6 Partner Countries.

In Chapter 6, a SWOT Analysis of the Aquaculture social acceptance is presented. Strengths, Weaknesses, Opportunities and Threats are listed, by each Partner Country.

The last chapter, Chapter 7, describes the Methodologies used for collecting information and a summary of the information collected.

## 2. Aquaculture in the world – Facts and perspectives

Today, 811 million people suffer from hunger and 3 billion cannot afford healthy diets.

Aquatic foods are increasingly recognized for their key role in food security and nutrition, not just as a source of protein, but also as a unique and extremely diverse provider of essential omega-3 fatty acids and bioavailable micronutrients.

Global production of fish and seafood has quadrupled over the past 50 years. Not only has the world population more than doubled over this period, but the average person also now eats almost twice as much seafood as half a century ago.

This has increased pressure on fish stocks across the world. Globally, the share of fish stocks which are overexploited – meaning we catch them faster than they can reproduce to sustain population levels – has more than doubled since the 1980s and this means that current levels of wild fish catch are unsustainable.

One innovation has helped to alleviate some of the pressure on wild fish catch: aquaculture, the practice of fish and seafood farming. The distinction between farmed fish and wild catch is similar to the difference between raising livestock rather than hunting wild animals. Except that for land-based animals, farming is many thousand years old while it was very uncommon for seafood until just over 50 years ago.

Global consumption of aquatic foods (excluding algae) has increased at an average annual rate of 3.0 percent since 1961, compared with a population growth rate of 1.6 percent. On a per capita basis, consumption of aquatic food grew from an average of 9.9 kg in the 1960s to a record high of 20.5 kg in 2019, while it slightly declined to 20.2 kg in 2020.

It is estimated that aquaculture production in the EU only covers 10 % of the domestic demand for fish and whereas more than a half of the demand for fishery products comes from imports from third countries, mainly from Norway.

The EU does not follow the growing global trend of aquaculture production. The European Union has been strengthening its dependencies on third countries, to meet its needs for aquatic-based food resources. Growth in the aquaculture sector has been at a standstill in the EU for several decades, in contrast to the other world trends.

The EU's aquaculture production is mainly concentrated in four countries covering 62% of the turnover and 69% of the sales weight in EU27: Spain (27%), France (18%), Italy (12%), and Greece (11%).

The EU aquaculture sector has three main production sectors: Marine fish, Shellfish and Freshwater fish production.



The marine fish sector is the most important economically and generated the largest turnover of €1 811 million, followed by the shellfish sector with €1 266 million and the freshwater sector with €1 016 million.

Despite all of its benefits, aquaculture production and consumption in the European Union (EU) has not grown at the same pace as in other parts of the world. Of the total consumption of fish and seafood by the average EU citizen, only 25% originated from aquaculture.

The EU is highly dependent on imported aquatic food, mainly from Norway's salmon industry.

The EU imports over 70% of the fish and seafood that it consumes.

The aquaculture sector recorded an average annual increase in direct employment of 4.29% from 1995 to 2018. Globally, aquaculture today provides direct work for an estimated 20.5 million people, accounting for approximately one third of all workers engaged in fisheries and aquaculture.

EU aquaculture sector provides jobs for 69,000 persons in 15,000 enterprises.

This includes ten thousand owners and family members engaged in small family driven businesses contributing to the social dimension. More than 80% of the enterprises in the aquaculture sector are micro-enterprises, employing less than 10 employees.

Globally, agriculture is being relied upon to feed a population projected to reach 9.3 billion in 2050. To achieve that, food production will need to increase from the current 8.4 billion tonnes to almost 13.5 billion tonnes a year.

As the global population increases the competition for already scarce land, water and energy resources intensifies. And there is the growing impact of climate change to contend with, to which agriculture itself contributes significantly.

However, the recent growth in aquaculture has helped to increase the supply of seafood, kept the overall price of fish down and eased the pressure on wild-caught fish stocks.

Seafood is a healthy source of animal protein, providing calcium and minerals, omega-3 and other beneficial fatty acids, and vitamins B12 and D<sup>1</sup>. Seafood also has an environmental advantage in terms of resource use in relation to other animal protein production systems.

Despite the understanding of its ability to address the challenges of global nutrition and technological advances that have allowed better monitoring of environmental impacts, as well as optimizing the management of productive activity, the aquaculture industry still faces strong animosity from the local communities regarding new projects for fear of the environmental harm the farms may cause.

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<sup>1</sup> U.S. Department of Agriculture and U.S. Department of Health and Human Services (2020), "[Dietary Guidelines for Americans, 2020-2025](#)"

Over the last five decades aquaculture has developed, diversified and made remarkable progress both technological and scientific. The success of modern aquaculture is based on the proper management of the biology of cultivated species, the introduction of technological innovations, the development of specific feeds and business organization.

The potential of these advances for economic growth in both developed and developing countries, for improving living standards and for increasing food security was already recognized by FAO in its 2000 Bangkok Declaration and Strategy, which stressed that aquaculture must continue its development to offer its full potential to humanity.

### 3. Country Profile

#### 3.1. Portugal

Portugal has a long-standing tradition and history in fisheries. Despite its limited contribution to the gross domestic product (GDP), the Portuguese fisheries' sector represents a primary sector of significant socio-economic importance, particularly in coastal areas.

#### Aquaculture Production

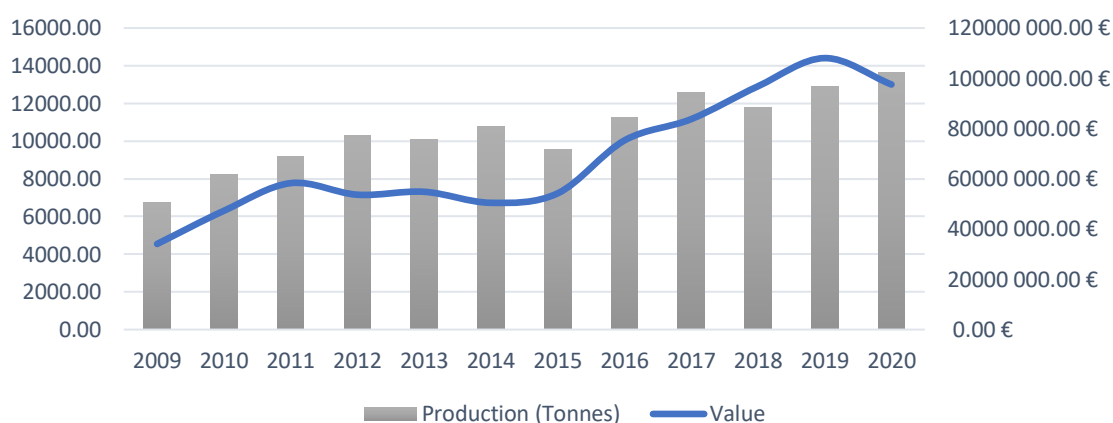


Figure 1. Portugal: Aquaculture Production (tonnes) & Value (€) <sup>2</sup>

Portuguese aquaculture production has doubled in 10 years (from 6726.6 tonnes in 2009 to 13.3 million tonnes in 2020). This growth was due to: (1) new investments in offshore aquaculture (mainly sea bream); (2) increased oyster production extimulated by the French market; (3) and the intensification of turbot production.

The intensive production of turbot in recirculation systems has become one of the most important assets of Portuguese production capacity. Currently, the largest European turbot production unit is in Portugal.<sup>3</sup>

Most Portuguese farmers work with typical extensive and semi-intensive systems in earth ponds and cannot compete with other EU producing countries which rely mostly in intensive systems with higher densities and lower production costs. Therefore, a huge marketing effort should also

<sup>2</sup> Portugal, Eurostat ( [FISH AQ2A](#) )

<sup>3</sup> Interview with the secretary general of the Portuguese Aquaculture's Association (APA)

be made near consumers to distinguish between products from different origins and to promote extensive and semi-intensive fish as high-quality goods. New niche markets to these high-quality products should then be created and explored, internally but also for export. Still, Portuguese consumers are very sceptical concerning aquaculture products. An effort to demystify some of these misconceptions and promote aquaculture products as high nutritional value, high quality, easily available, highly controlled, healthy and safe food, is urgent.

## Market Structure and Consumption Profile

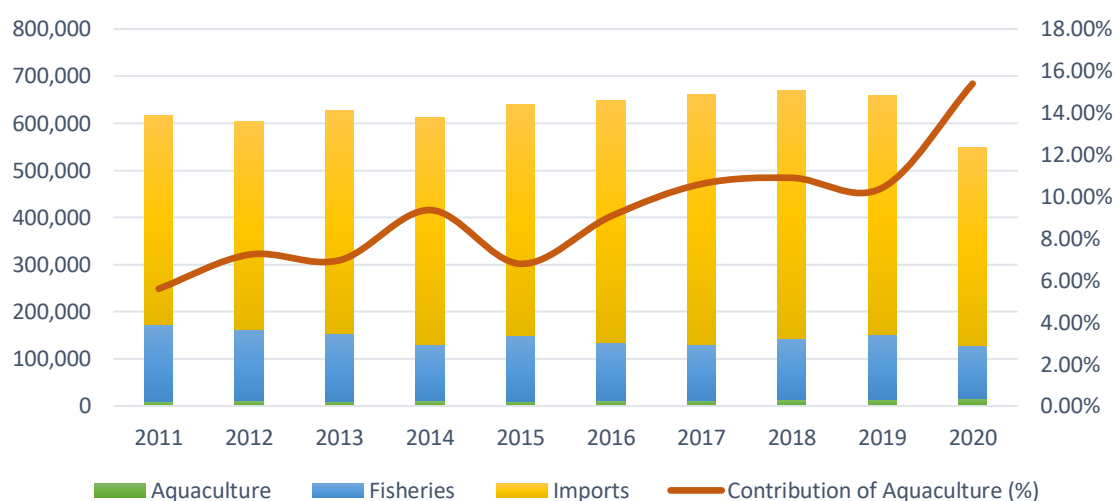


Figure 2. Portugal: Sourcing of aquatic food<sup>4</sup>

In the last 20 years, the contribution of aquaculture compared to fisheries has tripled in Portugal. In 2004, aquaculture had a productive capacity that represented 4.46% of fisheries. In 2020, aquaculture contribution accounted for 15.39% of fisheries.

Nevertheless, due the high consumption rate of fish and the performance of the fish processing industries, imports remain the main source for the Portuguese market.

Portugal is by far the main fish consumer inside the EU 27 with 56.9 kg per capita/year, while the EU average is 21.4 kg/ head/year.

However, Portuguese consumers are sceptical about aquaculture. This might be related with unconstructive messages, commonly spread among consumers, which result in the preconceived idea that seafood from aquaculture is generally of a worse quality compared to

<sup>4</sup> INE, Portugal

wild fisheries. Vast improvements in the public image of the aquaculture sector need to be undertaken. Stakeholders have the huge challenge of clarifying consumers about the positive aspects of aquaculture products and in the demystification of several erroneous ideas.

### 3.2. Spain

#### Aquaculture Production

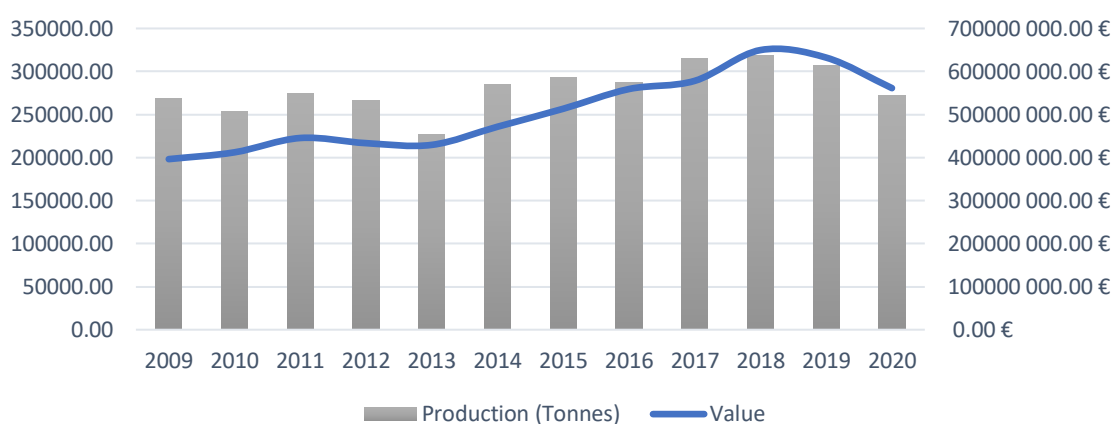


Figure 3. Spain: Aquaculture Production (tonnes) & Value (€) <sup>5</sup>

In 2020, Spain produced 272 097,69 tonnes of fish (including molluscs and crustaceans), with a value of USD 2774.3 million. 22% of this value came from aquaculture and 78% from fisheries (that is, the capture of wild resources). Between 2008 and 2018, the quantity produced increased by 9%, while its value decreased by 17%.

#### Market Structure and Consumption Profile

In Spain, the aquaculture market is dominated by small and medium-sized producers, although there are also some large companies. The distribution sector is highly fragmented, with many small-scale distributors serving local markets. The processing sector is also relatively small, with most processing taking place on-site at the production facilities.

<sup>5</sup> Spain, Eurostat ( [FISH\\_AQ2A](#) )

The most commonly produced species in Spanish aquaculture are sea bass, sea bream, and trout, which are produced mainly in marine farms and freshwater facilities. Other species produced in smaller quantities include mussels, oysters, and clams.

Seafood consumption in Spain is relatively high compared to other countries, with an average consumption of around 46 kg per capita per year. However, the consumption profile in Spain is more focused on fresh seafood, with a preference for fish over other seafood products. In fact, fish accounts for over 60% of the total seafood consumption in Spain.

The most commonly consumed fish species in Spain include hake, anchovy, sardines, and tuna, which are mainly caught in the wild. However, the consumption of aquaculture products is also significant, with sea bass and sea bream being among the most popular species.

In recent years, there has been a growing interest in sustainable aquaculture practices in Spain, with a focus on reducing the environmental impact of the industry and improving the welfare of the farmed animals. As a result, there has been an increase in organic and certified aquaculture production, as well as the development of new technologies for the production of fish and other aquatic organisms.

### 3.3. France

#### Aquaculture Production

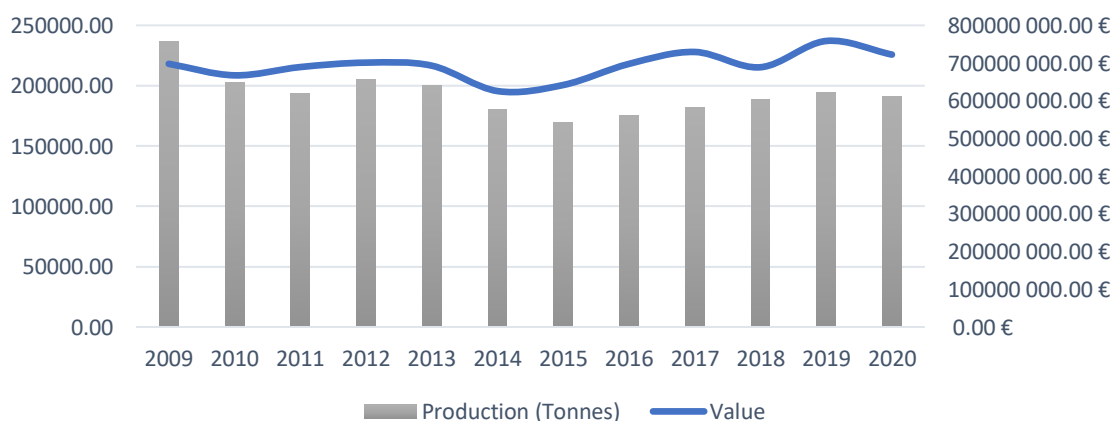


Figure 4. France: Aquaculture Production (tonnes) & Value (€) <sup>6</sup>

<sup>6</sup> France, Eurostat ( [FISH\\_AQ2A](#) )



According to the latest data from the Food and Agriculture Organization of the United Nations (FAO), France produced 186,303 tonnes of aquaculture products in 2019, with a total value of \$780 million. The majority of this production came from shellfish farming, particularly oysters and mussels, which accounted for 94% of the total volume and 81% of the total value. Finfish farming, including trout and sea bass, made up 5% of the total volume and 16% of the total value. Seaweed farming represented a very small portion of the country's aquaculture production.

The main regions of aquaculture production in France are Brittany, Normandy, and the Pays de la Loire. Oyster farming is particularly important in these regions, with the majority of French oysters being produced in Brittany. Mussel farming is also significant in these areas, as well as in the Mediterranean region.

France is known for its high-quality seafood products, and the country's aquaculture industry plays an important role in maintaining this reputation. The industry is also an important source of employment, particularly in coastal areas where it provides jobs for fishermen, processors and other related industries.

### Market Structure and Consumption Profile

The aquaculture market structure in France is diverse, with a mix of small-scale family-owned farms and larger companies operating in the industry. Shellfish farming, particularly oyster and mussel production, is the dominant sector of the aquaculture industry in France, accounting for the majority of production and revenue. Finfish farming, including trout and sea bass, is also significant but on a smaller scale.

The consumption profile of aquaculture products in France is also diverse, with a range of species consumed by the population. Shellfish, particularly oysters, are very popular in France and are consumed throughout the year, with peak consumption during the Christmas and New Year holiday season. Other shellfish species such as mussels and clams are also popular. Finfish consumption in France is dominated by salmon, followed by trout and sea bass. Other species such as carp, pike-perch, and sturgeon are also consumed, but on a much smaller scale.

In recent years, there has been a growing demand for organic and sustainably produced aquaculture products in France, as consumers become more aware of the environmental impact of food production. This has led to an increase in organic and environmentally certified aquaculture products in the French market, although these products still represent a small share of overall aquaculture production.

### 3.4. Ireland

#### Aquaculture Production

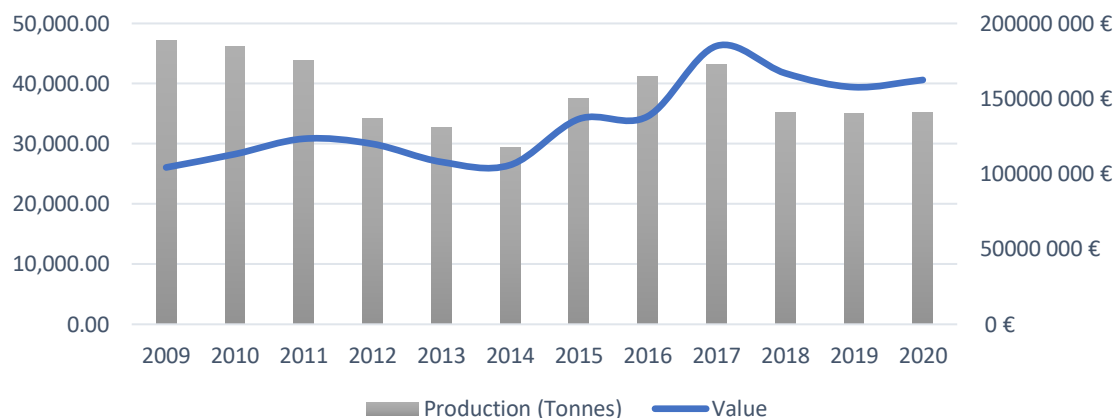


Figure 5. Ireland: Aquaculture Production (tonnes) & Value (€) <sup>7</sup>

According to the latest available data from the Central Statistics Office of Ireland, the total aquaculture production in Ireland in 2020 was 37,587 tonnes, which was a decrease of 14.1% from the 2019 production of 43,763 tonnes.

The majority of aquaculture production in Ireland comes from marine finfish, which accounted for 71% of the total production in 2020. Shellfish, including mussels and oysters, accounted for 25% of the total production, while rainbow trout accounted for the remaining 4%.

In terms of specific species, Atlantic salmon was the most commonly farmed finfish in Ireland in 2020, accounting for 58% of the total marine finfish production. Other farmed marine finfish species included sea trout, cod, and turbot.

The aquaculture industry in Ireland faced some challenges in recent years, including outbreaks of disease and environmental issues. However, the government has been working to address these challenges and support the growth of the industry through initiatives such as the development of a National Marine Planning Framework and the introduction of a new scheme to support the sustainable growth of the sector.

<sup>7</sup> Ireland, Eurostat ( [FISH\\_AQ2A](#) )

### Market Structure and Consumption Profile

The aquaculture market structure in Ireland is dominated by a small number of large companies that account for the majority of the country's production. According to the Irish Sea Fisheries Board (Bord Lascaigh Mhara), the top 10 aquaculture producers in Ireland account for approximately 80% of the country's total production.

In terms of consumption, seafood is an important part of the Irish diet, with fish and shellfish consumption per capita averaging around 23 kg per year. Salmon and cod are among the most popular species consumed in Ireland, along with mussels, oysters, and prawns.

The majority of seafood consumed in Ireland is imported, with only a small percentage coming from domestic sources. This is partly due to the fact that the Irish aquaculture industry has faced some challenges in recent years, as mentioned earlier, which have limited its capacity to meet domestic demand. However, there has been a growing interest in promoting locally produced seafood in recent years, with initiatives such as the "BIM Seafood Development Centre" aimed at supporting the development of new seafood products and markets.

Overall, the Irish aquaculture industry faces both challenges and opportunities as it seeks to expand and meet growing demand for sustainable seafood. Efforts to address environmental issues and improve the sustainability of the industry, along with initiatives aimed at promoting locally produced seafood, are likely to play an important role in shaping the future of the Irish aquaculture sector.

### 3.5. United Kingdom

#### Aquaculture Production

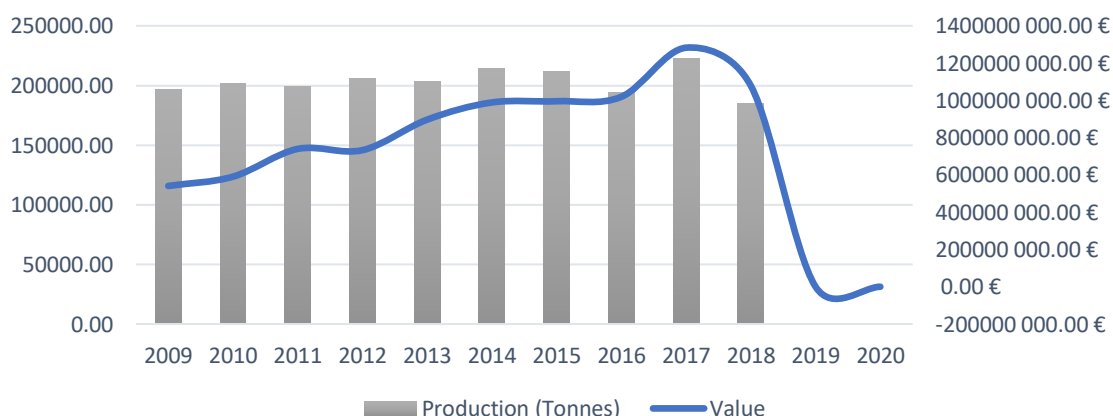


Figure 6. United Kingdom: Aquaculture Production (tonnes) & Value (€) <sup>8</sup>

<sup>8</sup> France, Eurostat ( [FISH\\_AQ2A](#) )

Aquaculture production in the United Kingdom (UK) and Wales has been growing steadily over the past few decades. The industry is focused on producing a variety of seafood products, including salmon, shellfish, and trout.

In the UK, the aquaculture industry is primarily concentrated in Scotland, which accounts for over 60% of the country's total production. According to the Scottish Government, in 2020, Scotland produced around 191,000 tonnes of farmed Atlantic salmon, making it the largest producer of farmed salmon in Europe.

Wales also has a growing aquaculture industry, with a focus on shellfish farming. According to the Welsh Government, in 2019, the industry produced 2,035 tonnes of shellfish, primarily mussels and oysters. Wales also has a small trout farming industry, producing around 500 tonnes of trout each year.

### Market Structure and Consumption Profile

The aquaculture market structure in the UK and Wales is relatively diverse, with a mix of large and small-scale producers operating in the industry. Salmon farming is dominated by a small number of large companies, while the shellfish sector is made up of many small-scale producers.

In terms of consumption profile, seafood is a popular food choice in the UK, with an estimated 45% of households regularly consuming seafood products. The majority of seafood consumed in the UK is imported, with only around 10% being domestically produced.

The UK is the third-largest consumer of seafood in Europe, after Spain and France. The most popular seafood products consumed in the UK are salmon, cod, haddock, prawns, and tuna. Shellfish, including mussels and oysters, are also becoming increasingly popular.

In terms of sustainability, there is a growing focus on promoting sustainable aquaculture practices and reducing the environmental impact of the industry. Both the UK and Welsh governments have set targets for increasing sustainable seafood production and reducing the reliance on imports.

## 4. How can aquaculture activities be beneficent for...

### 4.1. Sustaining employment and livelihoods

#### Portugal

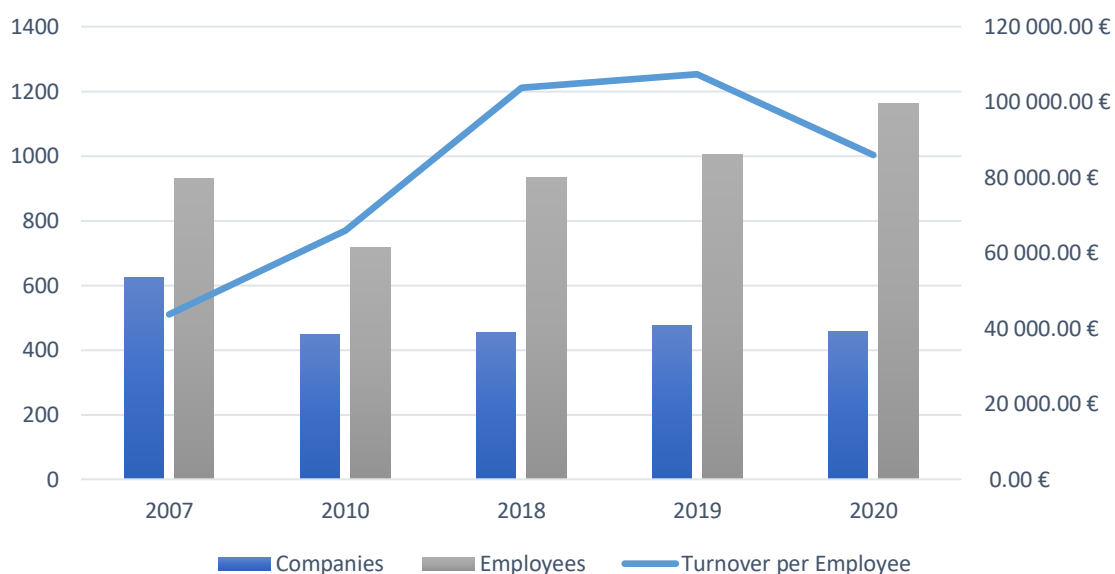


Figure 7. Portugal: Companies, Employment and Turnover per employee<sup>9</sup>

In the last decade, the number of companies has been reducing but employment has grown by 38.30% in the Portuguese aquaculture sector.

The productivity expressed by turnover per capita has been growing until 2019. However, with the impacts of the pandemic and the consequent revenue of producers, in 2020 we saw a fall in productivity that will probably be quickly recovered in the short term.

Aquaculture proves to be a sector with an increasing capacity to generate jobs. It should be highlighted that in indirect terms, in Portuguese academies and research organisations there are several of highly qualified people who are dedicated to working in the development of knowledge and innovation for the sector. Indirect jobs are not expressed in the figure, but they are relevant for the understanding of the overall employment capacity of the sector.

<sup>9</sup> Ministério da Economia e Mar & INE

In addition to the employment opportunities, both direct and indirect, provided by the aquaculture activities, there are also two other important aspects:

1. The preservation of traditional fishing communities: Aquaculture activities can help to preserve traditional fishing communities by providing an alternative means of livelihood that is less dependent on wild fish stocks. This can help to reduce pressure on overfished stocks and support sustainable fishing practices.
2. Tourism: Aquaculture activities can also have a positive impact on tourism, particularly in coastal areas where visitors may be interested in seafood-related experiences such as visiting fish farms or participating in shellfish harvesting activities.

Aquaculture activities can be a valuable tool for sustaining employment and livelihoods in Portugal, particularly in coastal and rural communities where traditional sources of income may be limited.

## Spain

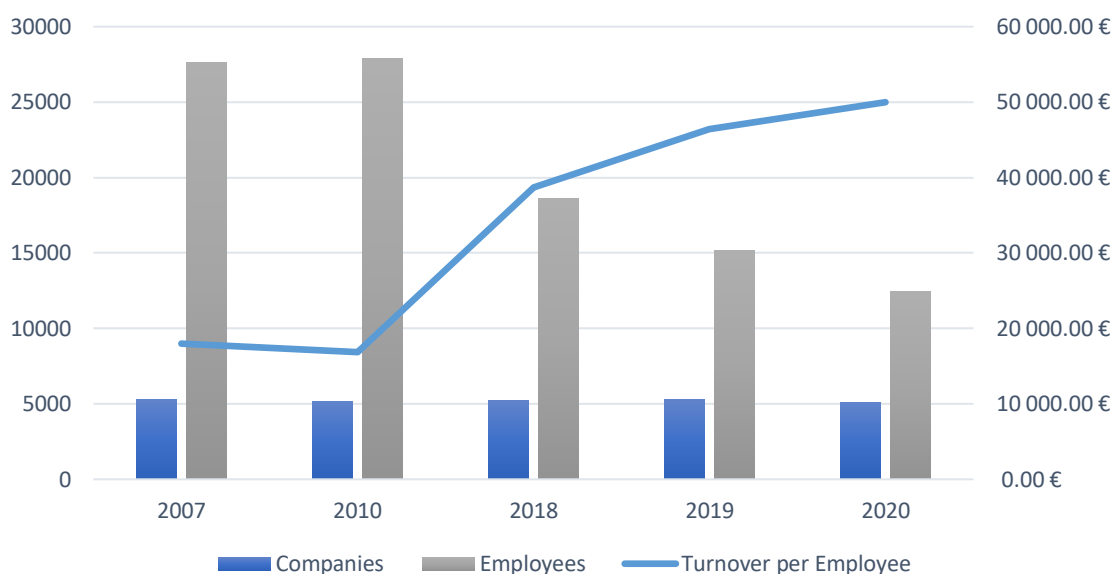


Figure 8. Spain: Companies, Employment and Turnover per employee<sup>10</sup>

Among the 35 respondents the majority stated that they do think that aquaculture activities in Andalusia have the potential to provide employment, as the sector is growing and will therefore create direct and indirect staff needs. Indirect needs would include secondary activities resulting from the primary aquaculture activities, i.e. production; these include, for example, animal care,

<sup>10</sup> [Ministerio de Agricultura, Pesca y Alimentación](#)



veterinary and quality control, product transformation, feed, construction of installations, processing, packaging, among others. However, none of the replies were a clear “yes”, especially in terms of long-term or sustainable employment and livelihoods. The general consensus was that it depends on numerous factors and/or conditions, for example, there must be more interest and commitment from public administration, as well as a more structured development of the sector. Moreover, it depends on the type of aquaculture, and access to qualified staff required for most of the positions. In general, respondents seem to think that aquaculture activities have the potential to create employment, but there remain numerous limiting factors and the sector is not sufficiently developed yet.

When considering the different sectors, the industry states that currently the aquaculture sector is not considered by the public administration as a sector that creates stable employment and/or economic wealth. However, by establishing a network and cooperation between research and industry it could become more sustainable in sustaining employment and livelihoods. The response from the general public also shows that there is potential, but it depends on how the sector will develop and competition from other countries, for example. The academic view in this regard was that there are many influencing factors, like any sector, resulting more from the politics in the respective country than from the sector itself. It can create jobs, but it's not a wide-ranging sector that offers many employment opportunities. The response from public administration seemed to be more focused on the fact that the sector can offer stable employment, but this is dependent on availability of the required expertise.

Finally, when asked if the respondents knew of any regional or local funding mechanisms aimed at creating sustainable employment in the aquaculture sector, the reply was either that there are no mechanisms or that they didn't know of any.

## France

There is a strong support from regional and local authorities to increase the number of jobs in aquaculture in Brittany. The European funds from the European Maritime and Fisheries Fund is a key tool in this respect. The creation of jobs in aquaculture is viewed as a mean to boost the regional economy and to create other activities such as maintenance or navigation.

However, the sector is not structural for the local economy yet as it is not able to employ employees during the whole year according to representatives of the CRC Bretagne Nord. The aquaculture sector in Brittany is dominated by shellfish culture and the latter employs workers during the high season, which is in winter. During the other months, the aquaculture sector is not employing enough persons to be considered as being structural for the region. Thus, this argument can be contested by local population and is hardly useable to raise the acceptability level.

Academic researchers explained that overall, compared to other regions in France, aquaculture is having an important role in the economy of Brittany.

According to administrative managers of the Brittany region, the importance of the aquaculture sector is not recognised as being significant by local citizens, despite aquaculture's strong contribution to the maritime economy in Brittany. Most of citizens do not have enough knowledge on maritime issues to consider aquaculture as being an important sector for employment in Brittany. One of the solutions to increase the contribution of aquaculture on regional employment would be to increase the exploited surfaces.

In order to increase the number of employments in the aquaculture sector, new farms must be created on possible sites.

Finally, the SUCCESS's survey on consumer preferences demonstrates that over 69% of French interviewees agree to say that the development of fish farms is creating jobs. This latter survey shows that aquaculture can be seen as having a significant role for creating jobs and boosting the national economy.

## Ireland

Aquaculture activities are very important to sustain the employment and livelihoods of the people in Ireland. A reliance on the aquaculture industry in remote coastal areas of the northwest and southwest of Ireland, where economy faces greater challenges in a national context due to its geographic isolation. The economic significance of the aquaculture industry in these peripheral areas is indisputable. All jobs created in these regions will have a knock-on effect on improved livelihoods for the people as they have a regular income.

There has been a steady reduction in the number of businesses operating in some sectors of Irish aquaculture from 2009 to 2018. This consolidation process has been fuelled by foreign direct investment by a large multinational in the case of salmon farming and in the case of bottom grown mussels and oyster farming via investments from Dutch and French shellfish farmers. There is a move away from seasonal employment in the shellfish sector, with an increase in automation due to associated rising costs.

Employment over the 2009 to 2018 period, has fluctuated between 1,700 and 1,900. In 2018, 1,948 persons, equating to 1,077 Full Time Equivalents (FTEs) were directly employed.

In 2018 employment increased slightly by 1%, when compared to 2017, despite it being a challenging year. Overall employment in 2018 was highest in the North (25%), followed by the Southeast (18%) and the West (15%). Employment is set to remain stable for 2019 and beyond given present production trends and steady market demand.

Employment in 2009 was over 1,900 persons and after some fluctuations has returned to this level in 2018, having dropped to lows between 1,700 and 1,800 persons in 2012. Full-time equivalent employment (FTE) meanwhile varied from just over 900 to 1,050 in the same period. Native oyster employment may have been over-estimated due to lack of data obtained.

Female employment level, over this time, has remained relatively static, ranging from 120 to 150 or from 6.4% to 8.2 % of total employed.

The shellfish sector was the biggest employer over the period and included the greatest proportion of part-time or seasonal work. The Finfish sector by contrast, provided mainly full-time employment and the best average wage, in excess of €40,000 annually.

### United Kingdom

The UK produces a narrow range of aquaculture species. Rainbow trout dominates freshwater culture. Salmon smolts (juvenile salmon) are also grown in freshwater before on growing in the sea, with 45.5 M individuals put to sea in 2015 (Marine Scotland Science 2016), equivalent to ca. 3000 t biomass. Scotland is by far the biggest aquaculture producer in the UK by volume and value (Table 1). In the marine environment, Atlantic salmon (*Salmo salar*) dominates, and is almost entirely produced in Scotland (Jennings et al., 2016). Scotland also produces a third of UK mussels. While Wales is home to one of the largest mussel farms in the UK, farmed oysters are also grown in bags attached to metal trestles on the shore in sheltered areas around the coast.

Wales is also leading the production of native lumpfish. Parasitic sea lice are the biggest threat to salmon farming, a £15 billion industry and the cornerstone of Europe's aquaculture. Lumpfish can reduce the use of anti-parasitic drugs by 80% (Powell, et al., 2018; Whittaker, et al., 2020).

The Centre for Sustainable Aquatic Research pioneered in collaboration with The Cleaner Fish Company the use of native, disease-screened lumpfish in the UK. The research has influenced all the Cleanerfish sector and supported the creation of the Welsh cleaner fish industry, which now supplies the biggest salmon producers including Marine Harvest (Scotland) Ltd (now Mowi). Innovation has allowed production of lumpfish at CSAR to increase from 5,000 juveniles in 2014 to over 2 million in 2019, most of which is now coming from locally sourced stocks.

The UK fish and seafood market is currently dominated by imports (43 per cent) and capture fisheries (40 per cent) with aquaculture making up only 17 per cent of domestic supply (Jennings et al. 2016). The main export markets for UK salmon are the USA (34 per cent), France (23 per cent) and China (12 per cent).

The English industry is predominantly re-laid in intertidal bays but considerable expansion of suspended mussel production in England is proposed (e.g. Offshore Shellfish Ltd, n.d.). There are no marine finfish farms in England and Wales but other marine farms do exist on land.

### Comments:

**In Portugal**, aquaculture sector represents about 6 % of the catches, but this activity is growing rapidly and could become an important activity for the fisheries sector. Regarding job creation According to the latest available data from the Portuguese Institute for the Sea and Atmosphere (IPMA), the aquaculture sector directly employs around 7,500 people in Portugal.

According to "Aquaculture Sector Report 2020," (July 2021), the aquaculture sector directly employs around 14,000 people **in Spain**. In addition to these direct jobs, the aquaculture industry supports other related industries such as processing, distribution, and retail, creating further employment opportunities.

Spain is one of the largest producers of farmed fish in Europe, with a focus on species such as sea bass, sea bream, and trout. The aquaculture sector is expected to continue growing in the country, with a government target to increase domestic seafood production by 20% by 2025. This growth is expected to generate further employment opportunities in the sector and its associated industries.

According to the latest available data from the French Ministry of Agriculture and Food, the aquaculture sector directly employs around 7,000 people **in France**.

In addition to these direct jobs, the aquaculture industry supports other related industries such as processing, distribution, and retail, creating further employment opportunities. Particularly in Brittany, the aquaculture sector is viewed as a means to boost the regional economy, creating jobs and to create other activities such as maintenance or navigation. Despite the aquaculture's strong contribution to the maritime economy, the importance of the aquaculture sector is not considered as significant.

**In Ireland**, aquaculture activities are seen as very important to sustain the employment and livelihoods of the people. According to the latest available data from the Irish Sea Fisheries Board (BIM), the aquaculture sector directly employs around 1,900 people in Ireland. In addition to these direct jobs, the aquaculture industry supports other related industries such as processing, distribution, and retail, creating further employment opportunities.

The Irish government has identified the aquaculture sector as a key growth area and has set a target to increase domestic seafood production by 45,000 tonnes by 2023. This growth is expected to generate further employment opportunities in the sector and its associated industries.

According to the latest available data from the UK government's Department for Environment, Food and Rural Affairs (Defra), published in September 2020, the aquaculture sector directly employs around 12,000 people **in the UK**, with an additional 10,000 jobs supported in related industries such as processing, distribution, and retail.

The aquaculture industry is expected to continue growing in the UK, with a government target to increase domestic seafood production by 100,000 tonnes by 2025. This growth is expected to generate further employment opportunities in the sector and its associated industries.

## 4.2. Enhancing edible supplies of seafood

### Portugal

Portugal is a country with a long coastline and a strong fishing tradition. In addition, In Portugal fish consumption is significant. However, wild fish stocks in the oceans are becoming increasingly depleted due to overfishing, climate change, and other environmental factors. In spite of aquaculture is still not well accepted by general public, people are becoming more and more aware of the importance of consuming aquaculture products because it can help supplement the supply of seafood and reduce pressure on wild fish stocks.

### Spain

Among the 36 respondents there was a clear consensus that products from aquaculture can enhance the supply of seafood. In fact, 21 respondents (55,3%), of which 8 were from the general public, 7 from the industry, 3 from public administration and 3 from academia, stated that the extent to which aquaculture activities contribute to enhancing seafood products from the sea is very significant, followed by 13 respondents (34,2%), of which 5 were from the general public, 5 from public administration, 2 from the industry and 1 from academia, consider it significant. Although the explanations ranged, there were clear overlaps between the advantages of consuming products from aquaculture compared to other sources. For example, the most common denominator among the responses are price/quality ratio, continuous availability, environmental benefits, e.g. avoiding overexploitation of wild populations, and standardized quality control from the start, e.g. avoiding risks of contamination and controlled animal welfare.

When examining the responses according to sector, there does not seem to be clear differentiation among the respondents. The main advantages remained represented in all sectors, e.g. respondents from the general public seemed to be just as aware of the traceability and consistent quality control as respondents from the industry; and in terms of advantages of price/quality ratio, all sectors seemed to agree. There seems to be more scepticism, however, among the public regarding the feed component, mainly with regard to origin and quality.

When asked which strategies they could think of to increase consumption of products from aquaculture, there was also a clear consensus that the principle limiting factor remains social acceptability. There is a need for communication, marketing, and awareness raising about the aquaculture sector in general and about individual products and processes, increased availability of information about and traceability of the products, not only on farm level, but also traceability of the feed administered. Apart from awareness raising among the public, there was also a suggestion to direct the sector itself in a more sustainable direction, as well as the creation of (Protected) “Denomination of Origin” (PDO) labels, increased traceability of products,



information about the origin and composition of feed, among others, which would automatically improve the image of aquaculture.

## France

According to the CRC Bretagne Nord, shellfish consumers in Brittany are motivated to buy mussels to increase their edible supplies of seafood and of protein. Mussels have specific nutritive qualities; this argument is used to defend these products. Moreover, mussels do not lose their nutritive value during the cooking process, which is very convenient and consumers recognise this advantage. The situation differs regarding oysters as they are not consumed as often as mussels and are more likely to be consumed during special days such as new years' eve or Christmas dinners. Therefore, the arguments to defend the nutritive quality of oysters are focusing on the pleasure to savour few of them.

Administrative managers of the Brittany region had a similar opinion, they considered that aquaculture products in Brittany are consumed for special events and not as a daily meal.

Nevertheless, the nutritive quality of aquaculture products is not the only element that consumers take into account before buying them. Indeed, the price is having a significant influence on consumers' choice according to academic researchers. In order to enhance the consumption of aquaculture products, focusing on the reduction of their price could also be a possible strategy.

There must be discussions between all stakeholder in order to define to what extent we can increase the supply of seafood products depending on economic, social and also ecological factor. Due to climate change, this supply of seafood will change and a certain limitation on what is produced must be studied.

Thus, we can conclude that arguments on the nutritive qualities of aquaculture products can be used to enhance its production and the edible supplies of seafood.

## Ireland

Aquaculture provides important employment in peripheral areas, increases the range and accessibility of fish, shellfish and other edible aquatic species to the consumer and helps to reduce the EUs trade deficit on sea products. Aquaculture output for the 2009-2018 period has varied from 30,000 to 50,000 tonnes. It remains mainly export-driven, marine based, with a smaller land-based, freshwater aquaculture sector. Fluctuation in production value over this period is predominately due to production variations for salmon sea-farms, and to a lesser extent, the volume of bottom grown mussels produced. Overall, production value has seen a net gain from under €100 million in 2009 to €180 million in 2018; this despite limitations to output capacity, linked to licensing and consequent reductions in salmon production. This value



growth was made possible by steady increases in the unit value of product driven by a growing recognition of Irish product quality and provenance through the achievement of international certifications such as MSC, and Organic Labels. Total turnover is predicted to continue to increase in 2019.

## United Kingdom

### England, Wales and Northern Ireland

The contribution of aquaculture to the economies of England, Wales and Northern Ireland is modest; but it is diverse, spread widely across all three countries, closely associated with quality seafood and aquatic products important to the image of some regions, and locally important in rural areas. It also produces healthy seafood, with opportunities for growth that do not exist in capture fisheries. Indirectly aquaculture makes a substantial contribution to healthy recreation and leisure for millions of people through countryside visits, angling and ornamentals. Aquaculture produces healthy seafood, with opportunities for growth that do not exist in capture fisheries. Indirectly aquaculture makes a substantial contribution to healthy recreation and leisure for millions of people through countryside visits, angling and ornamentals.

Aquaculture in Wales is worth £11.8m (2017).

### Scotland

In 2018, the total number of staff employed in marine salmon production in Scotland increased by 77 (5.5%) to 1,466 people, despite a cyclical decrease in the production of Atlantic salmon, rainbow trout, brown and sea trout.

The report published in 2017 by the Government Office for Science entitled “The future of the sea: trends in aquaculture”, states that Aquaculture has considerable social benefits: for example, Scottish aquaculture production generates at least £1 billion in turnover across the UK and supports 8,800 jobs. This report highlights that There are relatively few studies on public attitudes to aquaculture development but those that have been undertaken do not point to a widespread antipathy to aquaculture (Whitmarsh and Palmieri 2009; 2011), especially when appropriate information is provided (Altintzoglou et al. 2010; Chu et al. 2010).

#### Comments:

Spanish stakeholders, coming from the general public, industry, public administration and academia, seem to be in consensus in what concerns the enhancement of seafood supply from aquaculture products. However, there seems to be more scepticism regarding the origin and quality of the seafood from aquaculture, particularly coming from the general public, suggesting that a raise of awareness is needed towards a more sustainable direction, as well

as the creation of (Protected) “Denomination of Origin” (PDO) labels, increased traceability of products, information about the origin and composition of feed, among others, which would automatically improve the image of aquaculture.

In France, the administrative managers of the Brittany region consider that aquaculture products are consumed for special events and not as a daily meal. The nutritional quality of aquaculture products is a key element for consumers, as well as the price. In fact, academic researchers suggest that, to enhance the consumption of aquaculture products, there should be a reduction of their price, as a possible strategy to increase the consumption.

In Ireland, the aquaculture sector provides important increase on the range and accessibility of fish, shellfish and other edible aquatic species to the consumer and helps to reduce the EU's trade deficit on sea products.

The UK states that aquaculture produces healthy seafood, with opportunities for growth that do not exist in capture fisheries.

### 4.3. Contributing to national tax revenue

#### Portugal

According to the latest available data from the European Market Observatory for Fisheries and Aquaculture Products, the aquaculture production in Portugal in 2019 was about 40,000 tons, worth around €180 million.

In terms of tax revenue, the Portuguese government collects taxes on the profits generated by aquaculture companies, as well as on the salaries and wages of their employees. Additionally, the government may also collect other types of taxes, such as value-added tax (VAT) on the sale of aquaculture products. The exact amount of tax revenue generated by the aquaculture sector in Portugal will depend on a variety of factors, such as the size and profitability of individual companies, the tax rates applied by the government, and other economic conditions.

It is estimated that the blue economy represents 3 % of the Portuguese GDP.

#### Spain

Among the 37 respondents, 17 (45,9%) state that the contribution to national tax revenue (national GDP) is minimal, followed by 10 (27%) giving the contribution slightly more importance. However, there was a clear consensus that a growing sector would, of course, create employment and, consequently, contribute not only to national GDP in Spain but also to regional economic growth in Andalusia.

## France

Considering the weight of Aquaculture at the national level, its contribution to the national tax revenue remains low. Enhancing its production and the consumption of its products would be a strategy to increase its contribution to national tax revenue.

Moreover, we don't have the figures for the regional level. We don't know the contribution to regional revenue of shellfish or more globally for marine aquaculture.

## Ireland

Estimated GDP in 2018 was €1.25 bn

## United Kingdom

Total benefit to the economy as whole is likely to be closer to £100 million in revenue and 1,700 FTE jobs (including indirect and induced). The industry also makes a substantial contribution to household (aquaria, ponds, etc.) and countryside education and recreation (lakes, rivers, fisheries, countryside destinations, etc.). Most of the jobs in aquaculture in England, Wales and Northern Ireland are associated with small businesses serving relatively local demand, especially in recreational fisheries. Some producers are closely integrated with these fisheries and other service/retail activities, and it is difficult to separate the contribution of aquaculture from these other activities.

### Comments:

The aquaculture production in Portugal was 92,406 tonnes in 2020<sup>11</sup>, which represents a decrease of 4.4% compared to the previous year (96,648 tonnes in 2019). In terms of value, the aquaculture production in Portugal was worth €221.9 million in 2020, which represents a decrease of 5.5% compared to the previous year (€234.9 million in 2019).

In Portugal, the blue economy represents 5 % of the Portuguese GDP. The blue economy refers to economic activities that are related to the oceans and other bodies of water, such as fishing, shipping, marine tourism, and renewable energy. However, aquacultures represent less than 1% of Portugal's GDP.

The aquaculture production in Spain was 322,521 tonnes in 2020<sup>12</sup>, which represents a decrease of 1.3% compared to the previous year (326,569 tonnes in 2019). In terms of value, the aquaculture production in Spain was worth €684.7 million in 2020, which represents a decrease of 3.3% compared to the previous year (€707.8 million in 2019).

<sup>11</sup> Eurostat

<sup>12</sup> Idem

In Spain (particularly Andalusia), the stakeholders considered the contribution of aquaculture products to national tax revenue (national GDP) to be minimal. Despite that, it is consensual that a growing sector would create employment and, consequently, contribute not only to national GDP in Spain but also to regional economic growth in Andalusia.

The aquaculture production in France was 215,025 tonnes in 2020<sup>13</sup>, which represents a decrease of 0.7% compared to the previous year (216,536 tonnes in 2019). In terms of value, the aquaculture production in France was worth €566.1 million in 2020, which represents a decrease of 2.2% compared to the previous year (€578.9 million in 2019).

France data consider that the weight of aquaculture contribution to the national tax revenue remains low, at the national level. Enhancing the production and the consumption of aquaculture products could be a strategy to increase its contribution to national tax revenue. At the regional level (e.g., Brittany) that are no figures available.

The aquaculture production in Ireland was 44,971 tonnes in 2020<sup>14</sup>, which represents an increase of 3.3% compared to the previous year (43,529 tonnes in 2019). In terms of value, the aquaculture production in Ireland was worth €204.7 million in 2020, which represents an increase of 6.1% compared to the previous year (€192.8 million in 2019).

The aquaculture production in the United Kingdom was 198,643 tonnes in 2019<sup>15</sup>, which represents a decrease of 3% compared to the previous year (204,604 tonnes in 2018). In terms of value, the aquaculture production in the UK was worth £239.9 million in 2019, which represents a decrease of 5% compared to the previous year (£253 million in 2018).

<sup>13</sup> Ibidem

<sup>14</sup> Ibidem

<sup>15</sup> Department for Environment, Food and Rural Affairs (Defra) and the Marine Management Organisation (MMO)

## 5. How can aquaculture activities be beneficent for...

### 5.1. Minimising pollution and water quality impacts

#### Portugal

The majority of Integrated Multitrophic Aquaculture (IMTA) in Portugal is on land, taking advantage of existing aquaculture tanks. IMTA offshore is still taking its first steps, but some tests with filter feeding species (oysters, mussels) have already taken place. Two systems have been detected – joint cultivation or separated cultivation – involving, in general, three trophic levels. Joint cultivation of: oysters with meagre or gilt-head bream; macroalgae, oysters, meagre, sea bream and mullet. Separated cultivation of: sea bass, sea urchins and macroalgae; macroalgae, sea bass and gilt-head bream; halophytes associated with aquaculture effluents. The production scale is generally low, with a range of final products from the direct sale to species production to extract bioactive compounds.

IMTA is a special field of aquaculture which presents a huge potential in terms of sustainability. This type of production integrates, on a same system, species that use artificial food with others, such as herbivores/filter feeders and/or micro and macroalgae, taking into account their interactions, as well as the use of nutrients and metabolites from the excretion of the fed species. In IMTA systems, unused excretion metabolites of fed species are recycled, producing food, energy and/or fertilizer used on the production of other integrated species. The negative effects of effluents in the environment are, therefore, reduced. On a minor extent, the amount of food needed for the species on the top of the food chains is also reduced, allowing to release the pressure on marine stocks. IMTA is a solution that goes beyond environmental sustainability, stimulating economic diversity and allowing the reduction of economic risk, as well as promoting the acceptability of the aquaculture sector by the general public. Thus, IMTA may be the next step on the future of aquaculture.

IMTA is very flexible, as systems can be implemented onshore or offshore, on seawater or freshwater, and with several combination of species. The most common combinations are shrimps/molluscs, fishes/molluscs/algae, fishes/shrimps and shrimps/algae.

#### Spain

Climate change is affecting the aquaculture sector deeply in terms of production, species, farming systems, etc. One of the most important changes is taking place in the temperature change, affecting water quality, causing imbalances in production cycles and even affecting the type of cultivated species and, consequently, affecting oxygen, salinity, changes in the currents, and creating a greater frequency of storms that cause damage to the facilities, etc.

For the academy and industry other consequences are that these changes are providing pollutants that end up in farm animals, reducing water oxygen, facilitating the spread of pathologies. Likewise, anthropogenic discharges increase the quality of nutrients and, therefore, eutrophication. In addition, they may contain other compounds such as drugs that can pass directly to the fish; it can incorporate elements that produce malformations in fry, which finally affects the mortality rate.

Aquaculture, like any agri-food industry, faces the challenge of sustainable development. Aquaculture has grown exponentially in the last 50 years, but today, improving sustainability remains a challenge.

According to the data collected, aquaculture is decisive for the conservation of the marshes and their biodiversity. The *salinas*, estuaries and current aquaculture techniques improve biodiversity, maintaining marine wetlands, capturing CO<sub>2</sub>, etc.

## France

Having shellfish products in specific areas is an indicator of the water quality. Indeed, shellfish can only be produced in high quality waters, thereby having a negative impact on water quality would be counterproductive for the shellfish sector. The shellfish culture is rather a victim of other activities having an impact on their production area than a polluting activity. In some cases, shellfish producers must stop the production of shellfish on some sites due to the low quality of water caused by external activities such as intensive agriculture.

In addition, producers must face up climate changes and need to consider alternative solutions such as using new areas or producing new species.

One of the solutions to increase the production level and the level of social acceptance would be to combine the aquaculture sector with the growing renewable energies sector. Indeed, creating new offshore wind turbines would facilitate the offshore production of shellfish in the same areas as both activities are compatible. Showing that aquaculture activities can be supported by the energy sector would increase its social acceptability level as it will contribute to the energy transition as well.

Academic researchers explained that the finfish production is having a negative impact on the environment in the Mediterranean area; thus, producers need to move their plants regularly to reduce this impact. Academic researchers pointed out that consumers do not have enough knowledge on this topic.

Nevertheless, administrative managers of the Brittany region explained that marine finfish production is not having a negative impact on water quality in Brittany (because we hardly have marine fish farms). The most important barrier to the development of aquaculture in Brittany is linked with space conflicts.



There is a lack of knowledge of the general public on the real environmental impacts of aquaculture farms. Environmental arguments are often used for political reasons without having a scientific reality.

Improving citizen knowledge on aquaculture effects on the environment is therefore a future challenge for this sector. Regarding citizen's knowledge, the SUCCESS's project showed that 51,8% of French people considers having no knowledge on fish farming.

## Ireland

During 2019, BIM were involved in a study to find an environmentally sound and cost-effective long-term solution for end-of-life oyster bags. The bags comprised of High-density Polyethylene (HDPE) mesh can have a usable lifespan of up to 10 years. Several oyster farmers are storing these bags in anticipation of an alternative solution to landfill becoming available. They prove difficult to recycle due to fouling and salt from their time in the marine environment. One of the major manufacturers is currently recycling bags, but energy and costs associated with cleaning and transport may impact the viability of this as a sustainable solution for the Irish sector. It is possible that bags could be repurposed rather than recycled. We are excited to explore opportunities to develop circular solutions for this problematic waste stream.

## United Kingdom

It is generally understood that lower trophic species (e.g. seaweeds, bivalves) have a lower impact than finfish aquaculture.

The production of cleaner fish (lumpfish, wrasse) is seen as a good alternative to delousing with chemicals.

### Comments:

Portugal is looking at IMTA as a developing solution that can go beyond environmental sustainability, stimulating economic diversity and allowing the reduction of economic risk, as well as promoting the acceptability of the aquaculture sector by the general public.

In Spain, climate change is considered as a risk factor, influencing the aquaculture sector deeply in terms of production, species, farming systems, etc. One of the most important changes is temperature change, which can affect water quality, causing imbalances in production cycles and even affecting the type of cultivated species and, consequently, affecting oxygen, salinity, changes in the currents, and creating a greater frequency of storms that cause damage to the facilities.

In France, aquaculture is considered as decisive for the conservation of the marshes and their biodiversity, by improving biodiversity, maintaining marine wetlands, capturing CO<sub>2</sub>, etc. Moreover, some aquaculture products can act as water quality indicators, such as shellfish. In fact, shellfish can only be produced in high quality waters and its production can be affected by low quality of water and also by external activities such as intensive agriculture.

Irish experiments refer to recycling in aquaculture (e.g., farmed oysters) as an example of an environmentally sound and cost-effective long-term solution for end-of-life oyster bags. There are manufacturers already recycling bags, but energy and costs associated with cleaning and transport may impact the viability of this as a sustainable solution for the Irish sector.

In the UK other solutions are referred to as having lower impact than finfish aquaculture, such as seaweeds and bivalves due to their lower position in the food chain. Also, the production of cleaner fish (e.g., lumpfish, wrasse) is seen as a good alternative to delousing with chemicals.

## 5.2. Minimising visual intrusion and landscape impacts

### Portugal

The visual impact of aquaculture in Portugal depends on the location and design of the facilities. In some areas, fish farms may be located offshore or in sheltered bays, where they are less visible from the coast. In other areas, however, fish farms may be located close to the shoreline or in areas with high tourist activity, which can result in visual intrusion and affect the aesthetic quality of the landscape.

To mitigate the impact of aquaculture on the landscape and environment, the Portuguese government has implemented regulations and guidelines for the construction and operation of aquaculture facilities. These regulations aim to ensure that aquaculture is developed in a sustainable manner, with a focus on minimizing visual intrusion and environmental impact.

### Spain

In Andalusia it is obvious that marine aquaculture is beneficial for minimizing the visual impact compared to other economic activities.

In the southern Atlantic area, aquaculture activity is the true conservator of estuaries and wetlands, favouring the biodiversity of the environment, both from the point of view of fauna and flora.

In the Mediterranean area, the activity hardly causes visual impact because the floats and other artifacts are almost imperceptible, especially when compared to other activities (greenhouses in the eastern area, tourism and buildings near the coast).

It is a compatible activity and, depending on the place where it is carried out, it can even contribute to the improvement of the visual impact with the recovery of flood areas.

## France

Some areas in Brittany are benefitting from tourism linked with the production of oysters such as the bay of Cancale. There, oyster producers are organising tours and are able to disseminate information on their activities which is raising the social acceptance level of aquaculture at the local scale. Therefore, shellfish production areas are viewed as being part of the landscape. Therefore, it would be interesting to support the touristic development of the aquaculture sector to minimise the visual intrusion feelings of citizens.

However, this is not the case for all shellfish producers as many of them in Brittany suffer from criticism on visual intrusion and space conflict. There is an existing competition between space users and production areas are seen by actors such as pleasure sailors as privatizing a common space. This is one of the most important challenges for aquaculture producers as criticism against the privatization of space is the most common argument against the development of their activities.

Spatial conflicts must be solved through public policies according to academic researchers. Although this solution might be facing some serious limits, including stakeholders in the decision process appears to be necessary to further develop the aquaculture sector onshore and offshore.

Social acceptability of aquaculture farms in the Brittany's landscape is quite high as it is considered as being part of the territory. Although, efforts can be done to increase this acceptability even more through the development of farms visits. Informal relations exist between aquaculture actors and restaurants' managers. These relationships could be institutionalised to enhance touristic visits in aquaculture farms and increase their acceptance in the regional landscape.

## Ireland

On the 20 February 2019 The Global Sustainable Seafood Initiative (GSSI) provided formal recognition of the BIM Certified Quality Aquaculture (CQA) scheme for Irish aquaculture products. The highly prestigious GSSI recognition shows that the BIM Farm Standard (Issue 1, Revision 1, November 2018) is in alignment with all applicable Essential Components of the GSSI Global Benchmark Tool (version 1.0, 8 October 2015). This is a great outcome for farmed Irish Seafood as it ‘future proofs’ the provenance of our products and gives our producers access to the premium markets.

The BIM Certified Quality Aquaculture (CQA) scheme is only the eighth seafood certification scheme, and only the fourth aquaculture certification, to be benchmarked against GSSI’s Global Benchmark Tool and to achieve recognition. The BIM Certified Quality Aquaculture (CQA) scheme is also the first government run scheme to achieve this much sought-after recognition.

GSSI is a benchmark platform that brings partners together from across the seafood sector worldwide to share knowledge and drive change by coming up with solutions to challenges in the sector.

It was set up, under the aegis of the UN FAO to bring more clarity into the marketplace due to the growing number of seafood certification schemes and to ensure consumer confidence in certified seafood, helping to make purchasing decisions more efficient by offering greater choice and driving down costs, while at the same time promoting environmental sustainability.

GSSI used a number of key reference documents as its basis. These included the FAO Code of Conduct for Responsible Fisheries (CCRF), the FAO Guidelines for Ecolabelling of Fish and Fishery Products from Marine/Inland Capture Fisheries and the FAO Technical Guidelines for Aquaculture Certification (FAO Guidelines) as the foundation to create a Global Benchmark Tool for seafood certification schemes. Through its Global Benchmark Tool GSSI works towards its collective objective to minimize the overall environmental impact of how we catch, grow and deliver seafood to meet a growing global demand.

The GSSI Tool is made up of 3 parts: a Benchmark Process, a Benchmark Framework with Essential and Supplementary Components and a Result. Seafood Certification schemes must go through an exhaustive 7-step Benchmark Process to be recognized by GSSI. The intention behind carrying out the Benchmarking exercise is for a seafood certification scheme to achieve equivalence and public recognition by GSSI as meeting the benchmark standard.

In turn the holders of the BIM CQA standards gain added value from participation as a result of GSSI “equivalence” status and thus stay ahead of emerging market demands so as to allow them to “choose the right customers” and occupy the top value niches in the marketplace.

## United Kingdom

This is highly dependent on the type of farming and where it takes place. As an example, in Swansea, mussels are farmed in a dock which has minimal visual impact or intrusion. Whereas salmon cages, or mussel ropes in locks in Scotland are seen as highly intrusive by locals.

### Comments:

Spanish previous experience states that aquaculture activities are not likely to cause major visual impact because the floats and other artifacts are almost imperceptible, especially when compared to other activities (greenhouses, tourism and buildings near the coast), in the Mediterranean area.

In France, and particularly in Brittany, there is a variety of touristic activities that can be associated with bivalve production, suggesting that touristic development of the aquaculture sector could contribute to minimise the visual intrusion feelings of the general public.

In Ireland, benchmark platforms have been created in order to bring partners together from across the seafood sector worldwide, to share knowledge and drive change by coming up with solutions to challenges in the sector. These platforms contribute to minimize the overall environmental impact of how the catch, grow and deliver of seafood functions to meet a growing global demand.

In the UK, there is a high dependence on the type of farming and where it takes place. For instance, mussels are farmed in a dock which has minimal visual impact or intrusion, whereas salmon cages, or mussel ropes in locks are seen as highly intrusive by the general public.

## 5.3. Minimising impact on natural seafood stocks

### Portugal

The aquaculture of carnivorous species, in particular, has been subject to intense criticism, due to the impact on natural marine stocks. This activity uses more fish biomass as a source of raw materials fish flour and fish oil incorporated in the artificial food, than that it can produce. Thus, the argument used is that of elevated losses of live marine resources, being unsustainable due to its continuous expansion.

The capture of wild stocks for posterior fattening (practice from capture-based aquaculture) is another factor that contributes to the reduction of natural stocks. For a long time, world aquaculture depended of wild eggs and hatchlings, by its recollection for posterior fattening in aquaculture facilities. In general, with the development of reproductive techniques in captivity,

the recollection of wild hatchlings is only performed for non-threatened species, as a way to guarantee that natural stocks are not put in risk, as in the case of several molluscs. However, there are still some species which life cycle is not closed in captivity and that are excessively captured for posterior fattening, such as the tuna.

Diversified scientific studies have been conducted as to identify alternative sources of lipids and proteins that produce no negative effect in growth, quality and animal wellbeing in aquaculture. There are other measures related to artificial feeding that can ensure the sustainability of aquaculture at a global level, namely the certification of raw materials sources used of aquaculture feeds, the development of new technologies on feeds production to improve its quality and optimize the use of diets.

## Spain

Currently, there is competition between fisheries and aquaculture.

Competition between both sectors should be taken into account not as a threat but rather the opposite, since aquaculture is an activity that can be complementary and should be treated as a strategy to reduce the impact on the preservation of the marine environment. Aquaculture is a complement that attempts to solve the main current problem that is the limitation of fishery resources and consequent limitations.

In the case of the Bay of Cádiz, the aquaculture sector contributes to the preservation of marine natural resources, to the improvement of the landscape, increased biodiversity and recovery of a traditional trade.

Aquaculture can help ensure the supply of global demand for fish that is impossible to maintain due to fishing without depleting natural resources, so it can help preserve them.

## France

The argument of using less natural seafood stocks is less used by shellfish producers as they do not want to start a conflict with the fishery sector. However, they recognise that their activity is beneficent for minimising the impact on natural seafood stocks. Currently there is no competition between both sectors.

A survey done in the framework of the H2O2O SUCCESS project shows that 46,7 of French interviewees considers that consuming wild fish contributes to the depletion of natural resources. Moreover, 58% considered that consuming farmed fishes preserves natural resources.

Administrative managers of the Brittany region explained that in Brittany, the fisheries industry and the aquaculture sector are focusing on different species, thus, the consumption of



aquaculture products is not having an impact on the fisheries industry and seafood stock. However, both sectors can cooperate with each other. For instance, fishermen can operate in neighbouring areas of the aquacultures farms in order to catch predators of aquaculture products.

Therefore, even if citizens consider that consuming farmed fishes allow to preserve natural resources, the difference of products between aquaculture and the fisheries is too important in Brittany to have an economic impact on each other. As a result, the fisheries industry can expand itself independently from the development of aquaculture.

## Ireland

### Structures and Production Cycle

#### *Salmon*

Offshore-exposed circular plastic cages of 20,000 metres cube capacity, are used. The production cycle is from 9 to 18 months depending on market size requirements. Smolts are transferred in spring to on-growing sites, then to finishing sites in preparation for harvesting. Maximum national production capacity is around 20,000 tonnes, though in practice, normally less, in keeping with strict organic stocking requirements. Capacity is restricted by available licensed sites.

#### *Oysters*

Production is carried out across 154 production units, run by 139 businesses and are distributed along the coast with concentrations of production in the South east and North west regions.

Intertidal production predominantly uses trestle bags but SEPA baskets, floating/suspended baskets and shelved baskets are increasingly used throughout the licensed area. Small seed (6-8mm) is mainly imported from French and UK hatcheries. Bigger, half-grown, stock is bought from sites within Ireland, specializing in earlier stages of the production cycle and some 2-3mm stock is supplied by local hatcheries. The full production cycle is from 3 to 5 years though an increasing number of units specialise in part of the cycle, reducing stock turnover time. The current maximum capacity is just over 10,000 tonnes and is restricted by available licensed ground.

#### *Rope Mussel*

Seed is sourced mainly from collectors situated close to on-growing areas in the spring or from collected rock seed. Growth cycles vary from 1 to 2.5 years depending on the bay. Fresh product is mainly 55-70 mm shell length (110-80 pieces per kilogram).

Production is concentrated in the South and South west; Cork and Kerry and to a lesser extent in the North west, from Killary harbour to Mulroy Bay. While red tide closures obstruct continuous production flow, the biggest impediment to the sectors growth remain the reliance on those markets that have a large home production stock, leading to periods of over-supply.

#### *Seabed cultured Mussel*

Wild seed is transferred from 20mm shell length (600 pieces per kilogram) from the Irish Sea or from local seed beds and harvested from 1 to 2.5 years later at 55 to 70 mm shell length (80 to 110 pieces per kilogram). The smaller size product (all are sold fresh) may be on-grown or sold as consumer-ready while the Dutch market favour the larger sizes for consumption.

The maximum capacity is 3,000 licenced hectares plus order ground which has held up to a maximum stock of 30,000 tonnes. Production is limited by stock management issues, rather than licensed ground capacity.

The BIM Certified Quality Aquaculture (CQA) scheme was set up, under the aegis of the UN FAO to bring more clarity into the marketplace due to the growing number of seafood certification schemes and to ensure consumer confidence in certified seafood, helping to make purchasing decisions more efficient by offering greater choice and driving down costs, while at the same time promoting environmental sustainability.

#### United Kingdom

There is a perception that aquaculture can have both positive and negative impacts on natural seafood stocks in the UK.

This depends on the species farmed. Carnivorous species depending on fish meal and fish oil have a negative impact on natural stocks. Native species in the lower trophic chain have minimal impact.

One concern is the potential for farmed fish to escape and breed with wild fish, which can lead to genetic pollution and the loss of genetic diversity in wild populations. Another concern is the use of fishmeal and fish oil in fish feed, which can contribute to overfishing of small fish species that are used to make these products.

#### **Comments:**

Portuguese studies have been identifying alternative sources of lipids and proteins that produce no negative effect in growth, quality and animal wellbeing in aquaculture. Moreover, other measures related to artificial feeding can ensure the sustainability of aquaculture at a global level, namely the certification of raw materials sources used of aquaculture feeds, the

development of new technologies on feeds production to improve its quality and optimize the use of diets.

In Spain, a competition between the fisheries and the aquaculture sectors has been reported, since aquaculture is an activity that can be complementary and should be treated as a strategy to reduce the impact on the preservation of the marine environment, and that attempts to solve the limitation of fishery resources and consequent limitations. Aquaculture can, thus, help to ensure the supply of global demand for fish that is impossible to maintain due to fishing without depleting natural resources.

On the contrary, in France, there seem to be no competition between both sectors, as aquaculture is recognised as an activity beneficent for minimising the impact on natural seafood stocks. Therefore, even if the general public consider that consuming farmed fishes allow to preserve natural resources, the difference of products between aquaculture and the fisheries is too important to have an economic impact on each other. As a result, the fisheries industry can expand itself independently from the development of aquaculture.

In Ireland, the certification of aquaculture brought more clarity into the marketplace due to the growing number of seafood certification schemes and to the guarantee of consumer confidence in certified seafood, helping to make purchasing decisions more efficient by offering greater choice and driving down costs, while at the same time promoting environmental sustainability.

In the UK, the minimization of the impact of aquaculture on natural seafood stocks depends on the species farmed. For example, carnivorous species depending on fish meal and fish oil have a negative impact on natural stocks, and native species in the lower trophic chain have minimal impact.

## 6. SWOT Analysis: Aquaculture social acceptance (By Country/Region)

### 6.1. Strengths

#### Portugal

- ✓ Long tradition of fishing.
- ✓ Established culture around seafood consumption.
- ✓ Favourable climate and geographic location.
- ✓ Good spatial planning.
- ✓ Clear identification of available areas (both offshore and in lagoons).
- ✓ Policies and regulations to support the development of aquaculture, such as the National Strategy for Aquaculture and the National Program for Aquaculture Promotion.
- ✓ Strong research and development system in aquaculture, which allows for the improvement of production methods and the development of new technologies.

#### Spain

- ✓ There are many aquaculture facilities in Andalusia.
- ✓ It is a determining activity for the conservation of the marshes and their biodiversity.
- ✓ Fresh products, nutritious and without risk of contamination (sound sanitary controls).
- ✓ More precise control of their origin and availability.
- ✓ Accessible price.
- ✓ Lower environmental impact.
- ✓ Reduction of overfishing.
- ✓ Improvement of the population diet.
- ✓ New business economy that in most cases is local.
- ✓ New employment opportunities.
- ✓ Existence of technological platforms.

#### France

- ✓ The relocation of these activities is nearly impossible so they are “sustainable activities” for our territories and can create indirect employment such as tourism, processing activities...
- ✓ The French market for sustainable seafood is growing, which could increase demand for aquaculture products.
- ✓ The existence of policies and regulations to ensure the sustainability of aquaculture operations, which could boost public trust and acceptance.
- ✓ Nutritive quality of shellfish (proteins for mussels and iron for oysters).
- ✓ Employment capacities and new job opportunities in rural areas where traditional industries are declining.
- ✓ Oyster and mussel productions have positive outcomes on the quality of water.

## Ireland

- ✓ Ireland's geographic location and natural resources, such as extensive coastline and nutrient-rich waters, make it well-suited for aquaculture.
- ✓ Nutrient rich waters.
- ✓ Sheltered bays suitable for aquaculture production.
- ✓ Environmentally sustainable production techniques.
- ✓ Global recognition as a leading producer of organic species.
- ✓ Established Production and capabilities.
- ✓ Experienced operators with proven track record.
- ✓ Technically advanced systems.

## United Kingdom

- ✓ Salmon aquaculture is well established
- ✓ Rope mussels are also well established.
- ✓ Sheltered lochs are ideal for aquaculture production.
- ✓ Research institutions provide direct support to the aquaculture industry in developing new products (e.g., species, feed) and processes (welfare guidelines, certification).
- ✓ Close proximity with EU markets, and main importers of mussels (e.g., Belgium).
- ✓ The UK government is actively promoting aquaculture as a means of achieving sustainable food production.
- ✓ The development of new technologies, such as recirculating aquaculture systems (RAS), has increased the efficiency and sustainability of aquaculture.
- ✓ Aquaculture can create employment opportunities and stimulate economic growth in coastal regions.

## 6.2. Weaknesses

### Portugal

- ✓ Preconceived idea that seafood from aquaculture is generally of a worse quality compared to wild fisheries.
- ✓ The difficulties faced by the aquaculture industry are mostly due to bureaucratic impediments, incomplete use of EU structural funds, insufficient coastal management plans and decreasing market prices, leading to poor investment and delaying the progress of Portuguese aquaculture.
- ✓ Most coastal areas in Portugal are not ideal for aquaculture mainly due to strong hydrodynamics and high-water depth; these disadvantages encourage the development of new and innovative ways to explore farmed species.
- ✓ Lack of public awareness and understanding of the benefits of aquaculture, leading to skepticism or opposition from certain segments of society.
- ✓ Aquaculture may compete with other industries for resources such as water and land, which could lead to conflicts with other stakeholders.

## Spain

- ✓ Some people perceive aquaculture as environmentally damaging and may oppose its expansion.
- ✓ Few companies dedicated to the aquaculture sector.
- ✓ Lack of technical scientific knowledge and research infrastructures for the aquaculture sector.
- ✓ Little tradition of R&D in companies (there are not enough R&D departments).
- ✓ Low investment and financing in R&D.
- ✓ Low dimension of production with a view to the market.
- ✓ Long term research.
- ✓ Lack of confidentiality and difficulty protecting knowledge.
- ✓ Need for improvement in the logistics and distribution structure.
- ✓ Low technology transfer.
- ✓ Low species identification.
- ✓ Insufficient training of agents in the commercialization chain of fishery and aquaculture products.
- ✓ Poorly differentiated products (need for improvements in labeling).

## France

- ✓ Spatial conflict.
- ✓ Offshore production is very limited.
- ✓ Regulation weight and mostly the complexity that favour possibilities for opponents to discuss projects and file appeals.
- ✓ Lack of knowledge of citizens on aquaculture and farmed fish.
- ✓ Lack of knowledge of citizens on aquaculture's impact on the environment.
- ✓ Aquaculture is rather a victim of the pollution of water than a contributor.
- ✓ Resorts and the opponents are often dominated by private interests and not by general interest.

## Ireland

- ✓ Complex Environmental requirements leading to delays in licensing process
- ✓ Insufficient investment in R&D.
- ✓ Insufficient product availability to meet market demand.
- ✓ Limited business planning from smaller operations.
- ✓ Fragmentation within certain sectors.
- ✓ Lack of private investment.
- ✓ Narrow focus of skills base and lack of entrepreneurship in the sector.
- ✓ Lack of scale in comparison to competitors and market size.
- ✓ Uncertainty in seed supplies for oysters.
- ✓ Uncertain seasonal availability of mussel seed.
- ✓ Lack of support services and ancillary industries.



## United Kingdom

- ✓ Regulatory constraints.
- ✓ The high cost of establishing and maintaining an aquaculture operation can be a barrier to entry for small businesses.
- ✓ Insufficient knowledge exchange between stakeholders - consumers, producers, funders, regulators and researchers.
- ✓ Not enough research - many industry gaps in knowledge.
- ✓ Limited effective long-term disease management.
- ✓ Number of differing topics.

### 6.3. Opportunities

## Portugal

- ✓ Aquaculture can provide a source of sustainable and high-quality seafood products, which can meet the growing demand for healthy and environmentally-friendly food.
- ✓ The strong influence of the Mediterranean Sea in the southeast coast makes ocean waters relatively warm and calm all year long.
- ✓ The industry can create new employment opportunities and contribute to the economic development of coastal regions.
- ✓ The use of new technologies, such as recirculating aquaculture systems and offshore farming, can help to address environmental concerns and increase efficiency and productivity.
- ✓ Offshore aquaculture and IMTA are positive prospects, which can overcome competition for marine space (offshore) and reduce environmental impacts.

## Spain

- ✓ Spain has a long tradition of fishing and seafood consumption and a growing demand for seafood, which can be leveraged to promote the social acceptance of aquaculture.
- ✓ Growing environmental awareness.
- ✓ 70% of respondents have knowledge about aquaculture.
- ✓ 60% of respondents consume aquaculture products about 2 to 3 times a week, compared to 15% who consume products 0 to 1 times a week.
- ✓ Regarding the marine products they consume, 76% say they are products from marine aquaculture.
- ✓ 75% of the people surveyed believe that it is a sustainable activity for the environment.
- ✓ Spain is a leader in aquaculture research and innovation, there are specialized R&D centres and large research capacity.

## France

- ✓ Combination of offshore renewable energies and offshore shellfish production (although it is currently impossible in Finisterre).
- ✓ New planification plan.
- ✓ Local distribution channel.
- ✓ Combination of fisheries activities and aquaculture.
- ✓ Inclusion of citizen and stakeholder's participation in spatial planning.
- ✓ Creation of Breizhmer, a new organisation gathering all the professional (aquaculture/fish farmers) in order to defend together their activities.

## Ireland

- ✓ Employment potential in Coastal Communities.
- ✓ Significant Export potential.
- ✓ Global demand for high-quality seafood.
- ✓ Off-shore aquaculture sites.
- ✓ Cost/efficiency benefits from consolidation.
- ✓ Underutilised aquaculture sites.
- ✓ Land and sea-based nursery sites.
- ✓ Market gaps (e.g. oysters).
- ✓ Development of shellfish hatcheries.
- ✓ Novel species and niche products.
- ✓ Use of Financial instruments.

## United Kingdom

- ✓ Research increased from current levels
- ✓ Rapid increase in knowledge exchange between stakeholders - consumers, producers, funders, regulators and researchers
- ✓ Improve public perception
- ✓ Robust political commitment to industry with financial backing
- ✓ Number of differing topics

## 6.4. Threats

### Portugal

- ✓ Negative media coverage or public perception related to environmental or animal welfare concerns could also pose a threat to the growth and social acceptance of the industry.

- ✓ Competition from other countries and regions, which may have lower production costs or higher subsidies, could limit the competitiveness of the Portuguese aquaculture industry.
- ✓ The industry may face challenges related to climate change, such as changes in water temperature and ocean acidification, which could impact the growth and survival of fish and other aquatic species.
- ✓ The industry may also face challenges related to disease outbreaks, which could lead to production losses and negative perceptions from consumers.
- ✓ The aquaculture sector is mainly based on SMEs, which limits innovation and reduces the capacity of reaction and adaptation to difficulties, either from administrative or regulatory nature, or regarding production costs.
- ✓ A dispersed and reduced production strongly limits the capacity of negotiation with the buyers.
- ✓ Due to low entrepreneurial level and to business risk, companies of the sector feel significant difficulties to financing access.

## Spain

- ✓ Negative image of aquaculture among the public (and other sectors).
- ✓ Competition from abroad.
- ✓ The budget lines of funding mechanisms usually do not meet companies' needs.
- ✓ Minimal interest and support from the public administration. Negative perceptions of aquaculture by some stakeholders can lead to regulatory barriers or restrictions on expansion.
- ✓ Conflicting interests among Administration, Industry and Research sectors.
- ✓ Difficulties for aquaculture production due to topographic, or other environmental characteristics.
- ✓ Shortage of financial resources and/or investment.

## France

- ✓ Climate change.
- ✓ Decrease of water quality due to other activities.
- ✓ Fear on new diseases development.
- ✓ Social acceptability changes from a place to another place (highly "local").
- ✓ Opponents are not anymore only NIMBY but BANANA ((Built absolutely nothing anywhere near anybody)), hampering any development for the aquaculture sector and hampering "rational discussions".

## Ireland

- ✓ Fish diseases and parasites.
- ✓ Co-existence with other marine activities.
- ✓ Public opposition to industry.
- ✓ Natural occurring events such as algal blooms and diseases such as Amoebic Gill Disease.
- ✓ Spatial restrictions on aquacultural activities.
- ✓ Increased competition from companies outside the EU.
- ✓ Competition in the organic salmon sector.
- ✓ Further revisions of regulatory limits for biotoxins.
- ✓ Lack of access to finance.
- ✓ Constrained national public co-funding.
- ✓ Impacts of climate change on aquaculture.
- ✓ Impact on biodiversity from alien species.
- ✓ Impact on aquaculture due to eutrophication of marine water.

## United Kingdom

- ✓ Disease management and treatment can be costly for aquaculture businesses and can lead to negative publicity.
- ✓ Industry Regulations - site expansion, access new sites, consents.
- ✓ Sustainability - feed restraints, sector growth.
- ✓ Limited funding - research, industry grants, start-ups.
- ✓ Number of opinion topics.
- ✓ The negative environmental impacts of aquaculture, combined with the public perception of intensive farming, can lead to resistance from local communities and environmental groups.

## 7. Methodologies used for collecting information

The methodology used to collect information

For the present report information has been collected using both direct sources and indirect sources. Some partners have given preference to direct sources, others to indirect sources.

Here we present the methodologies used for collecting it, in each country, and a summary of the information collected by direct sources, when this was used.

### Portugal

In Portugal information was collected mainly by indirect sources as studies, reports, scientific papers, statistics and legislation, but some direct sources were also used.

#### Indirect sources used:

Portugal, Eurostat ( [FISH\\_AQ2A](#) ): Aquaculture production in tonnes and value

INE Portugal (Institute of National Statistics)

Ministério da Economia e Mar (Ministry of Economy and Sea)

Plano Estratégico para a Aquicultura Portuguesa 2014 – 2020 (Stratategic Plan for Portuguese Aquaculture 2014 – 2020), in

[https://www.dgrm.mm.gov.pt/documents/20143/43770/Plano\\_Estrat%C3%A9gico\\_Aquicultura\\_2014\\_2020.pdf](https://www.dgrm.mm.gov.pt/documents/20143/43770/Plano_Estrat%C3%A9gico_Aquicultura_2014_2020.pdf)

#### Direct sources used: Interview.

An Interview with the secretary general of the Portuguese Aquaculture's Association (APA) was carried out.

### Spain

In Spain information was collected mainly by direct sources and it was completed, when necessary, by indirect sources.

Direct sources used: a questionnaire applied to persons from different interest groups.

A questionnaire was created based on questions identified on previous activities of the project, mainly in the Local Experts Network (LEN) meetings (WP3).

This questionnaire was applied to different related interest groups: society, academy, industry and administration. From the 38 responses obtained, an analysis of the Social Acceptance of Aquaculture Sector in Andalusia, showing the different perspectives was carried out.

Here is the summary of the main results from the questionnaire:

The perception of Aquaculture in Andalusia is generally positive; respondents has highlighted the following aspects:

- fresh and healthy products available year-round for an accessible and constant price, lower risk of contamination and higher sanitary controls and traceability.
- aquaculture has reduced environmental impacts, including reduction of overfishing, compared to the fisheries industry.
- aquaculture sector is growing and, consequently, has the potential to provide employment opportunities in Andalusia, and a subsequent economic growth, in the region.

However, although there seems to be general social acceptability among the respondents of the questionnaire, this represents only a small portion of the population (38 respondents) and may be biased towards those with prior knowledge (70% of the respondents) and/or experience in the sector. In fact, almost all respondents mentioned the lack of social acceptability among the general public, one of the sector's main limiting factors.

The majority of respondents expressed concerns about:

- the sustainability of the employment with regard to sustaining livelihoods
- the minimal effect that the sector has on Spain's national GDP, at the moment.
- the lack of suitable financing and investment and adequate development of the sector.
- low interest in the sector from both from the side of the administration, which affects social acceptance among consumers.

#### Indirect sources used:

The information was completed by the following indirect sources:

Spain, Eurostat ( [FISH AQ2A](#) )

[Ministerio de Agricultura, Pesca y Alimentación](#)

#### France

In France information was collected mainly by direct sources but it was completed, when necessary, by indirect sources.



Direct sources used: Stakeholder's Interviews.

Interviews were made to the following stakeholders:

- Benoit Salaun, Comité Régional de la Conchyliculture Bretagne Nord (representative of aquaculture sector)
- Jose Perez, Marianna Cavallo, AMURE Université de Bretagne Occidentale, Brest. (researchers in the Blue Economy)
- Olivier Le Pivert, Cyril Rouault, Région Bretagne (Responsables for Aquaculture Policy, in Brittany)
- Didier Grosdemange, Gaïa Terre Bleue (Consultant in Maritime Projects).

Here is the summary of the main results from the stakeholder's Interviews:

Aquaculture is viewed by professionals as being an important sector in the regional economy in terms of employment capacities and also for cultural aspects. However, interviewees considered that the majority of citizens have little knowledge on aquaculture and maritime issues in general. This lack of knowledge can be the reason of many spatial conflicts and lack of support for the development of aquaculture. All interviewed stakeholders consider spatial conflicts as being the major barrier to aquaculture development.

The development of aquaculture can be done through several ways. New innovative methods must be adopted such as the creation of IMTA or through a more efficient beacons system allowing to expand farms to new areas.

Regarding issues on water quality, aquaculture in Brittany does not seem to have a negative impact even though local citizens seem to know little about this subject. More communication on the impact of aquaculture on water quality is desirable, in order to improve the sector's social acceptance. Finfish aquaculture is too limited to have any impact on the environment in this region.

In order to limit social conflicts, visual intrusion and to enhance the social acceptability of aquaculture, stakeholders explained that the sector must work in cooperation with other areas such as the fisheries industry, marine renewable energies and tourism. By doing so, the utilisation of the marine environment will be optimised and the feeling that the sea is privatised by one sector could decrease.

Aquaculture in Brittany concerns mainly the production of shellfish such as oysters and mussels. Companies remain very small, only a few of them are considered as big groups. The consumption of these products remains limited as they are not considered as being edible products of the daily life. Most of consumers buy these

products for exceptional events such as over the Christmas and new years' eve period. As a consequence, these products cannot replace edible supplies of natural seafood stocks and no real competition exists between aquaculture and the fisheries sector.

In general terms, the aquaculture sector in Brittany, concerns mainly shellfish culture and is composed of small companies, and it lacks visibility at the regional level. It is far to be identified as a strong sector by the general public and even by local politicians. However, there is a consciousness that these companies offer employments that cannot suffer from offshoring and that the sector is creating direct and indirect jobs.

They agree that there is a recent trend on consumers, both local and tourists for consuming products from the local aquaculture production, and this may increase the level of social acceptability.

The professionals are structured to make their voices heard better and have just created Breizhmer.

#### Indirect sources used:

The information was completed by the following indirect sources:

- France, Eurostat ( [FISH AQ2A](#) )
- SUCCESS (2015), Consumer preferences for sustainable seafood products from Europe, from: <http://www.success-h2020.eu/outputs/deliverables/>
- CESER Bretagne (2017), Produire et résider sur le littoral en Bretagne
- CESER Bretagne (2004), Pour une gestion concertée du littoral en Bretagne

## Ireland

In Ireland information was collected mainly by indirect sources, mainly from the 2019 Survey of the National Seafood Survey Aquaculture for Ireland.

Indirect sources used: 2019 Survey of the National Seafood Survey Aquaculture for Ireland

Bord Iascaigh Mhara (BIM) is Ireland's Seafood Development Agency. BIM helps to develop the Irish Seafood Industry by providing technical expertise, business support, funding, training and promoting responsible environmental practice.

Information was taken from their 2019 survey of the National Seafood Survey Aquaculture for Ireland.

<http://www.bim.ie/media/bim/content/publications/aquaculture/BIM-National-Seafood-Survey-Aquaculture-Report-2019.pdf>

#### Summary of the report:

Growth and development in the aquaculture industry have progressed in 2018 and 2019 but 2018 provisional data shows that there was a decline in net profit.

The sector is capital intensive, with the greatest cost normally being feed which stood at €19.6 million in 2018.

Average wage within the sector in 2018 was estimated at € 52,896.

The unique selling point has developed a stronger position. The consumer-ready product, mainly whole-round or head-on-gutted, is grown to exclusively organic certification standards and is exported to diverse markets; to the EU, North America and the Near and Far East. The less severe drop in overall value for 2018 is due to an increase in salmon unit value which now stands at an average of €9.55 for whole-round.

There is positive news that the mortality rate has not increased.

Despite the stresses that accompany production during extended periods of warm weather, no mortality spikes were recorded in 2018.

#### Other sources used:

Ireland, Eurostat ( [FISH\\_AQ2A](#) )

#### United Kingdom

In United Kingdom information was collected both from direct and indirect sources.

#### Indirect sources used:

The first section was based on reports available online, given that the questions can be checked based on data. However, UK data is not easily accessed, or centralized. The UK is constituted by 3 nations with individual governmental bodies, which makes the information sparse.

The SWOT analysis was based on a survey performed during Aquaculture UK 2017 by the Centre of Sustainable Aquatic Research.

Direct sources used: a questionnaire applied to persons from different interest groups.

A questionnaire was created based on the questions previously identified: 1) What are the 3 most important challenges facing UK aquaculture? 2) What are the 3 main barriers preventing these challenges being met? 3) What might be the 3 most useful solutions to remove these barriers?

A total of 60 participants answered the questionnaire, distributed as following: Researchers (26), Producers (24), Funder/Regulator (8), Retailer (1).



## Lead Partner



**Centro Europeo de  
Empresas e Innovación**

### CEEI Bahía de Cádiz

C/ Manantial, 13. Edificio CEEI  
Polígono Ind. Las Salinas de San Jose Bajo  
11500 El Puerto de Santa María (Cádiz) - Spain  
Tlf: (+34) 956 860 654 / Fax: (+34) 956 860 028  
E-mail: [asuares@ceeicadiz.com](mailto:asuares@ceeicadiz.com)  
Web: [www.ceeicadiz.com](http://www.ceeicadiz.com)



## Partners



**CENTRO TECNOLÓGICO  
DE LA ACUICULTURA**

Centro Tecnológico de  
Acuicultura de Andalucía  
Muelle Comercial S/N  
11500 El Puerto de Santa María (Cádiz) - Spain  
Tlf: (+34) 956 56 93 63  
E-mail: [mm.agraso@ctaqua.es](mailto:mm.agraso@ctaqua.es)  
Web: [www.ctaqua.es](http://www.ctaqua.es)



Swansea University  
Centre for Sustainable Aquatic Research  
Wallace Stores, Singleton Park  
SA2 8PP - Swansea  
Tlf: +44(0) 1792 29 53 83  
E-mail: [p.n.howes@swansea.ac.uk](mailto:p.n.howes@swansea.ac.uk)  
web: [www.swansea.ac.uk](http://www.swansea.ac.uk)



**Údarás na Gaeltachta**

Údarás na Gaeltachta  
Na Forbacha, Co. Dublin, Galway  
Tel: 091-503100  
Fax: 091-503101  
E-mail: [foh@udaras.ie](mailto:foh@udaras.ie)  
web: [www.udaras.ie](http://www.udaras.ie)

**WestBIC**



Innovation & Management Centre  
CLG T/A WESTBIC  
11 Galway Technology Centre, Wellpark Road  
Galway, H91 E2W5 - (Ireland)  
Tlf: (+353) 86 2574978  
E-mail: [smccormack@westbic.ie](mailto:smccormack@westbic.ie)  
web: [www.westbic.ie](http://www.westbic.ie)

**Technopole**  
Quimper-Cornouaille



Technopole Quimper Cornouaille  
2 rue François Briant de Laubrière  
29000 Quimper - Francia  
Tlf: +33(0)298 100 200  
E-mail: [rachel.sellin@tech-quimper.fr](mailto:rachel.sellin@tech-quimper.fr)  
web: [www.tech-quimper.fr](http://www.tech-quimper.fr)



**ciimar**

Centro Interdisciplinar  
de Investigação  
Marinha e Ambiental

CIIMAR | Interdisciplinary Centre of Marine and  
Environmental Research of the University of Porto  
Novo Edifício do Terminal de Cruzeiros do Porto de Leixões  
Avenida General Norton de Matos, S/N  
4450-208 Matosinhos | Portugal |  
Tlf: (+351) 223 401 852  
E-mail: [rodrigo.ozorio@ciimar.up.pt](mailto:rodrigo.ozorio@ciimar.up.pt)  
web: [www.ciimar.up.pt](http://www.ciimar.up.pt)



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UNIVERSIDADE DO ALGARVE

University of Algarve  
CRIA - Pavilhão B1  
8005-139 Faro (Portugal)  
Tlf: +351 289 800 097  
E-mail: [ajmarq@ualg.pt](mailto:ajmarq@ualg.pt)  
web: [www.ualg.pt](http://www.ualg.pt)



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