Study on the economic importance of activities ancillary to fishing in the EU

MARE/2011/01 Lot 2

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Executive summary

Introduction and methodology of the study

This study aims to analyse and collect economic and social data to assist DG MARE in assessing the impact of future policy orientations and to provide information for policymakers on the potential economic and social impact of different policy options, as well as the cost effectiveness of these.

In the European Union, both marine fishing and aquaculture are heavily regulated sectors. Consequently, a considerable amount of data is collected about the primary sector, e.g. the species caught or produced, employment, income generated and other sector-specific indicators. However, much less is known about the activities ancillary to marine fishing and aquaculture, including their contribution to the local and national economies. Therefore, this study aimed to analyse the economic importance of these activities, taking into account both upstream and downstream activities up to the first point of sale.

In addition, the study identifies the most important trends in this sector and places them in the context of the primary sectors of marine fishing and aquaculture. To obtain a better understanding of the underlying data, different segments[1] and subsectors of marine fishing and aquaculture were also considered, as were data and key trends in the sector complementary to marine fishing and aquaculture in order also to assess the economic importance of this sector. Finally, this study also researched the economic importance of other sectors closely related to marine fishing and aquaculture, namely shellfish gathering, inland fishing, ice fishing and the seaweed industry.

While the research into marine fishing and aquaculture focused on the economic importance of the sector ancillary and complementary to marine fishing and aquaculture, given the size of these sectors, the work on other sectors focused on the economic importance of the primary sector.

To fulfil the objectives of this study, different methods were used. First, desk research was carried out to collect all the available data published in literature, (commercial) databases and other relevant sources in all 28 Member States of the European Union. The desk research took into account all the official languages of the European Union. Second, a questionnaire was sent to relevant organisations in order to collect national and regional data. This ensured that data that is not publicly available (for instance in grey literature) was also collected. Third, 73 case studies were carried out to obtain quantitative data on employment, income and profit rates, as well as more qualitative data related to other socio-economic characteristics (e.g. male-female distribution, paid/unpaid labour, age levels, education levels, professional qualifications and working experience) and trends.

The data collected on the sector ancillary to marine fishing and aquaculture was extrapolated to estimate the economic importance of this sector at different levels: the European Union as a whole, individual Member States and at regional level. In addition, to the extent possible, estimates were made for each segment and subsector identified for both 2009 and 2014 to capture the evolution of these sectors over time.

Finally, the EU results were put in perspective by conducting desk research on six OECD countries outside the European Union.

Scope of the study and definitions used

Given the fact that many activities and sectors are either directly or indirectly linked to the primary fishing industry, it is important to clearly define the ancillary industry. In this study, all activities *up-to the first point of sale* that are directly linked to the primary sector are taken into account and therefore considered ancillary activities. Example activities are activities related to the servicing of equipment and/or vessels, activities related to the sale of fish, supplies for operations and R+D+I services. Processing industry is not included in the scope of the present study.

[1] For marine fishing, three segments have been defined: small-scale fishing, industrial fishing and long-distance fishing. For aquaculture four segments have been defined: marine finfish aquaculture, trout freshwater aquaculture, other freshwater aquaculture and bivalve aquaculture.

When looking at complementary activities, the activities taken into account are those that are undertaken by marine fishermen or fish farmers in addition to their core business as well as activities whom have replaced their core business and have no link to commercial marine fishing or aquaculture (e.g. pesca tourism, guardians of the sea, educational services, et cetera).

What is worth noting is that the ancillary services that companies provide themselves have not been taken into account in measuring the economic importance of the ancillary industry. In other words, when a company in addition to their activities in the primary sector also maintains its own equipment and vessels, sorts the fish and does its own management, data on these activities have not been included. Furthermore, data gathering was focused on specific regions or ports within the EU and therefore ancillary providers that are located outside the EU are out of scope of this study.

The sector ancillary to marine fishing

In marine fishing, the primary sector employed around 123,000 FTE and generated income of some EUR 6.8 billion in 2009 and around 109,000 FTE generating income of some EUR 7.0 billion in 2014. The sector ancillary to marine fishing – taking into account the activities in scope of this study – the corresponding figures were 35,000 FTE and EUR 2.8 billion of income in 2009 and 36,000 FTE and income of EUR 2.5 billion in 2014. In other words, the ancillary sector is around one-third of the size of the primary sector in terms of both employment and income generated.

Most of the employment and income generated in the ancillary sector relates to the servicing of equipment and/or vessels. This accounts for around 57% (53%) of employment (~19.500 FTE) and 41% (44%) of income (~EUR 1.1 billion) in 2009 (2014). Other large sources of income and employment are activities related to the sale of fish (about 20% (24%) in terms of employment and 23% (25%) in terms of income in 2009 (2014)) and supplies for operations (about 17% (16%) of employment and 34% (28%) of income in 2009 (2014)). R+D+I services are clearly the least represented subsector in marine fishing, accounting for around 7% (6%) of employment and only around 3% (3%) of income in 2009 (2014).

Looking at individual Member States, Spain, Italy and Greece seem to be the Member States where the ancillary sector is largest in terms of employment (about 65% of total estimated employment in the ancillary sector). Spain and Italy account for 45% of total estimated income in the ancillary sector[2]. These Member States are followed closely by France and the United Kingdom.

Three different segments were identified in marine fishing, each with their own characteristics: i) small-scale fishing, ii) industrial fishing, and iii) long-distance fishing. Ancillary employment related to small-scale fishing is estimated to have been around 15,000 FTE in both 2009 and 2014, while income is estimated at EUR 206 million in 2009 and EUR 303 million in 2014. The ancillary employment estimate related to industrial fishing for both years is 18,500 FTE, generating around EUR 2.4 billion in income in 2009 and EUR 2.0 billion in income in 2014. For long-distance fishing the ancillary employment is estimated at 2,000 FTE in 2009 and 1,487 FTE in 2014, generating EUR 206 million and EUR 251 million respectively. Clearly, long-distance fishing is the smallest segment in the European Union, while the industrial segment seems to employ a slightly higher number of FTE compared to small-scale fishing.

Employment numbers in the ancillary sector were essentially stable between 2009 and 2014, even though employment in the primary sector decreased significantly in this period. This is clear evidence that employment in the ancillary sector was quite resilient relative to the primary industry, i.e. the ancillary sector does not seem to be affected by a decrease in the primary sector. The same is not true of income in the ancillary sector, where the main explanation in the decrease in income from some EUR 2.8 billion in 2009 to some EUR 2.5 billion in 2014 appears to lie in a combination of decreased fishing opportunities and increased running costs (mainly due to increasing fuel prices between 2009 and 2014). Moreover, the economic crisis in the EU as a whole has decreased access to finance and slowed investments.

Overall, this has put pressure on ancillary companies' income without this so far resulting in a decrease in the level of employment. Two key trends in the ancillary sector largely account for this. On the one hand, ancillary companies are trying to reduce their dependence on local marine fishing by providing services to other regions within the same Member State, to other Member States and to the rest of the world, and on the other, they are providing services to other sectors, such as agriculture and other land-based and offshore industries (e.g.

[2] No data on primary income was available for Greece, so no estimates on ancillary income could be made.

oil and gas). Overall, ancillary companies are nevertheless still influenced by the primary fishing industry, albeit to a smaller extent.

Another trend in the ancillary industry relates to innovation. Innovation has become of increasing importance to the primary sector; new legal requirements and the need for efficiency has increased the demand for new, safer, and more efficient technical equipment and vessels. This has also had a clear impact on ancillary companies as they are increasingly investing in new technologies to meet this evolving demand. This has also had an impact on the education level of the employees found in the more technically oriented positions in the ancillary sector.

Looking at other socio-economic characteristics, gender distribution is weighted towards males, reflecting the balance currently generally found in the type of most technical job profiles in the ancillary sector. The jobs seem mostly to involve paid labour. The only exceptions were found in companies providing ancillary services only to the local small-scale fishing fleet. These are family-owned business with active involvement of unpaid family members. While the use of foreign labour is quite significant in the primary sector, this seems to be less of a factor in the ancillary sector. Most employees are local people with years of experience working in the ancillary sector.

Both the primary and the ancillary sector seem to be facing a struggle with the ageing of the workforce. The fishing industry – the primary and ancillary sector – appear to have limited appeal to younger people. The work is physically demanding and the prospects for the sector as a whole are uncertain (e.g. falling fishing opportunities and economic uncertainty in general). Younger people prefer to seek employment in industries that provide 'safer' employment. This could change. Professional educational programmes are being established and the industry in general is becoming more technology-dependent. Thus, education levels in the industry are rising because it requires deeper knowledge of (new) technology.

The sector ancillary to aquaculture

In 2009 and 2014, the sector ancillary to aquaculture employed some 19,000 and 24,500 FTE respectively, generating EUR 2.8 billion in 2014[3]. The largest segment in terms of employment was 'other' freshwater aquaculture (i.e. all freshwater aquaculture except trout). This provided more than half of all ancillary employment in 2014.

Looking at the division of employment over the different subsectors identified in aquaculture, three subsectors each provide around 30% of the ancillary employment, namely activities related to servicing of equipment and/or vessels, supplies for operations, and activities related to the sale of fish. Traditionally, feed is one of the most important ancillary activities in aquaculture. This is why activities related to the supplies for operations are so important, also in terms of income, where about half the total income generated is related to supplies for operations.

With respect to activities related to the servicing of equipment and/or vessels, employment seems to have more than doubled in 2014 compared to 2009. The explanation seems to that more and more aquaculture firms want for specialised and highly technical equipment, leading to an increase in employment in this subsector.

Looking at individual Member States, it is clear that the United Kingdom, Italy and Spain are those with the highest employment and income levels in the sector ancillary to aquaculture, where in terms of income, also Greece is an important Member State. The overall part-time ratio in this sector is estimated to be between 0.1-0.2, indicating that there is much more full-time employment in the ancillary sector compared to the primary aquaculture sector, where the part-time ratio is around 0.5. Work in the ancillary sector is much less seasonal and it is therefore easier to plan and maintain a stable number of employees. As ancillary companies have diversified their activities into many other sectors, this also provides a more solid basis for full-time working opportunities.

The gender distribution in the ancillary sector, seems to have an equal distribution of male and female employees in activities related to R+D+I services and pre-sale activities, while for activities related to the servicing of equipment and/or vessels and activities related to supplies for the operation, the jobs are mostly done by men. This can largely be explained by the nature of the work. The servicing of equipment and/or

[3] Unfortunately, too little data was available to make a reliable estimate for 2009.

vessels and activities related to supplies for operations are require more physical strength and therefore have traditionally been done by men. Most ancillary services are provided locally and, thus, the majority of the workforce in ancillary services is made up of local people.

Looking at the profitability of this sector, most services seem profitable. However, the extent of the profitability depends on the type of service. Production and provision of feed (where there is increased competition) and the supply of fuel (a commodity) have low profit rates of 2-4%. Far higher profit rates are seen in supplies of technical equipment, where companies show profit rates of 10-30%.

Historically, the majority of the employees in both the primary and ancillary sector have low levels of educational achievement. As the production process within aquaculture becomes more and more technologically sophisticated, with more technology needed in order both to comply with stricter (environmental) legal requirements and accommodate the desire to produce more efficiently, more technical know-how is required in the ancillary industry. This has already resulted in increasing education levels in recent years. Most jobs in this sector provide a great starting point for younger people with no or limited working experience. While most services are highly specialised, until recently, no educational programmes targeted the primary and ancillary aquaculture sector and thus learning and working experience could only be built on-the-job.

There are a number of important trends in this ancillary industry. First, there is more specialisation in services that require technical know-how, such as activities related to the servicing of aquaculture equipment and installations. It is mostly larger companies, often operating on a European or global scale, that provide these specialist services. They can afford to make ongoing investments and innovate. These companies have diversified the number of regions which they serve. Second, there is a tendency for ancillary providers of feed to be larger. Economies of scale drive growth and these companies also operate on a European or even global scale. Third, companies performing ancillary services that are provided locally, such as pre-sale activities, and maintenance and repair, are tending to diversify their activities to other sectors. They do this to decrease their overall dependency on the aquaculture industry, where many ancillary companies now seem to serve other sectors such as agriculture, the construction sector or even tourism. The end-effect of this diversification into other regions and sectors make the ancillary sector more resilient with respect to shocks in the primary aquaculture sector.

Complementary activities

Complementary activities are those undertaken by (ex-)fishermen or (ex-)fish farmers in addition to their core business and the activities of those who have replaced their core business and have no commercial link to commercial marine fishing or aquaculture. Many projects have received European Fisheries Fund (EFF) support to diversify out of the industry. Thirty projects funded under the EFF were identified that have generated at least 64 jobs[4]. There are thought to be far more projects in reality, since not all projects have communicated as widely as the projects included in this study. Hence, the impact of projects funded under the EFF can be thought to be greater than these figures suggest.

Overall, nevertheless, the sector complementary to marine fishing and aquaculture is only of limited economic significance relative to the primary sector and the ancillary sector. In fact, the activities are often not professionally organised. They do seem to be generating some income, but this is still marginal, both for aquaculture and for marine fishing. Employment is also limited, given that most activities are carried out by the fishermen or the fish farmers themselves without hiring additional employees. Nevertheless, these activities seem to be slowly growing over time, and some fish farmers and fishermen feel complementary activities are a welcome source of (additional) income.

Looking specifically at aquaculture, there is a tendency for complementary activities to be mainly initiated by the aquaculture companies themselves. These complementary activities mostly involve experiencing the product, via guided tours, tastings, restaurants and local shops. In marine fishing, most complementary activities involve guided tours and fishing trips.

[4] However, not all projects report on jobs generated.

Other sectors

During this study, four other (smaller) sectors that have a close link to marine fishing and aquaculture were researched (i.e. inland fishing, ice fishing, shellfish gathering and the seaweed industry). Overall, this provides a better overview on the economic importance of the primary industry of these sectors to the European Union.

Inland fishing

Commercial inland fishing has been in decline since the 1980's. In 2015, there have been between 14,000 and 15,000 vessels operating in commercial inland fisheries. Total catch volumes are estimated at 35,000 tons (1% of the total production of EU fishery products), generating EUR 100-110 million (1-2% of the total value of EU landings). This sector employs some 17,100 commercial inland fishermen operating within the EU (the equivalent to approximately 13% of the total number of fishermen in the European Union).

Most inland fisheries seem to supply local traditional demand and niche markets, and often have cultural value for local communities. Romania, Bulgaria, Italy and the United Kingdom seem to have the highest levels of employment in this sector (based on 2011 data). Legal requirements can have a particularly significant impact on the attractiveness of the sector. Hungary is to ban inland fishing, while Finland is regulating the minimum length of the fish caught.

Ice fishing

Ice fishing is a popular activity when ice covers the usual fishing grounds of large lakes and rivers. Ice fishing is primarily practiced in the north of Europe, and more specifically in the Baltic States, Finland and Sweden from November to March. Ice fishing is both a commercial and tourism/recreational activity, but is most important for the latter; little significant commercial ice fishing activity has been found. However, the importance of ice fishing as a recreational activity is expected to increase in future.

The seaweed industry

Europe is only a small player in the seaweed industry. Production remained stable above 350,000 tons until 2000 and has been decreasing ever since.

The European seaweed industry consists of (mechanical and manual) harvesting of seaweed and seaweed aquaculture. France and Ireland dominate the European mechanical harvesting of seaweeds. In Spain, seaweed harvesting is manual. Seaweed aquaculture is in an experimental phase in the European Union, with low volumes and resistance from (local) communities.

Overall, however, there is potential for both wild harvesting and aquaculture to grow, as there is an undersupply of seaweed in Europe. Whether this increasing demand will in fact stimulate European production or imports is still unclear.

Shellfish gathering

Shellfish are gathered in intertidal areas (coastal zones), and rivers or lakes both for commercial and recreational purposes. This activity is mainly found in Spain, Portugal, France, the Netherlands, Denmark and the United Kingdom. The main species gathered are abalone, clams, cockles, crab, crayfish, lobster, mussels, oysters, and scallops. Looking at Spain specifically, the sector is estimated to employ some thousands of shellfish gatherers working on foot. In other countries, shellfish gathering generates much less employment.

In the Netherlands and Andalusia in Spain, the gatherers are mainly men. In the Spanish region of Galicia, more than 90% are women, often fishermen's wives, who gather on foot, while male shellfish gatherers work from small-scale vessels.

Overall, shellfish gathering is important for specific local communities, but the economic importance of this sector is limited, both in terms of income and employment generated.

Other OECD countries

To put findings about the ancillary sector in the European Union into perspective, a comparison was also made with six OECD countries (Canada, Iceland, Japan, New Zealand, Norway and the United States). The findings were in line with the findings from the desk research in the European Union; the ancillary employment and income multipliers seem to lie between 0.5 and 1.0, both in marine fishing and in aquaculture (i.e. one

fishermen or fish farmer active in the primary industry is estimated to generate between 0.5 and 1.0 FTE in the sectors ancillary to marine fishing and aquaculture). Although this is slightly higher than the multipliers found in the case studies, it is similar to the results of the desk research on the European Union. The difference seems to be mainly the result of differences in the method and definition applied during the collection of multipliers. This appears to be especially true of downstream activities, where the definition seems to go beyond the first point of sale (e.g. retail, secondary processing, etc.), while this study only goes up and until the first point of sale.

The multipliers in aquaculture seem to be higher than those found in marine fishing, albeit marginally. This finding is also consistent with the findings collected in the European Union. In terms of the dependence on and overall resilience of the ancillary sector relative to the primary sector, the findings also seem to be in line with the findings collected in the European Union. In some local communities, dependence on the primary industry can be quite significant, but dependency decreases when services can be easily transferred to other sectors and regions or countries.

Usability of findings of the study and recommendations

This study provides insights into the economic importance of the *sector ancillary to marine fishing and aquaculture*. It provided estimates on the size of employment and income generated in this sector, as well as its subsectors and segments, at EU, Member State and regional level. Overall, these quantitative figures can be used to improve assessments of the effectiveness of European Maritime and Fisheries Fund subsidies in relation to marine fishing and aquaculture.

In relation to the other four (smaller) sectors (i.e. ice fishing, inland fishing, the seaweed industry and shellfish gathering), this study provides insight into the economic importance of the *primary sector*. Although not much quantitative and qualitative data is available for these sectors, this study provides some estimates. It has identified potential for the seaweed industry to develop as demand for seaweed is increasing in the EU.

Finally, this study also researched the economic importance of activities complementary to marine fishing and aquaculture undertaken by (ex-)fishermen and (ex-)fish farmers. It proved difficult to collect data on this industry, since data is mostly collected within wider tourism statistics with little or no link made with marine fishing and aquaculture. Nevertheless, based on the anecdotal evidence collected, this complementary sector seems to be expanding. More fishermen see the potential of tourism trips as an adjunct to their fishing activities. In aquaculture as well, more and more fish farmers are engaging in activities promoting the fish or in tourism, albeit on a small scale. Overall, these activities still do not seem to be generating much additional employment or income, as they are mainly carried out as promotional activities by the fishermen or aquaculture firms themselves. Hence, although the industry has potential, its economic importance is still limited.

In general, ancillary activities related to fishing – marine fishing and aquaculture – are still for a large part dependent on the primary sectors in scope of this study. Therefore, it is recommended that policy makers should always include ancillary activities when decisions are made that impact the primary sector. In this way, the total effects of a decision on the complete supply chain are taken into account. In the same sense, it would also be recommended to collect data about the ancillary sectors on a more structural basis. Overall, data collection on the ancillary sector is still limited, while it can thus add significant value to policy-making. Therefore, data gathering by local or regional governments should be better equipped to facilitate the process of decision-making on data collected from both the primary and the ancillary sector.

In addition to the above, some more specific recommendations can be made as a result of this study:

- The sector complementary to fishing and aquaculture shows significant potential. Some local initiatives, especially related to tourism, have already created significant value for local communities. Some of these initiatives have been financed by the EFF in the 2007-2013 period, but the EC can strength the use of EMFF to these initiatives for the 2014-2020 period and to consider them on future financial instruments if possible. Complementary activities create work and income opportunities for women, whom are mainly active in this industry. At the same time, these complementary activities also provide more income and employment in other (touristic) sectors. An example is found in ice fishing. Although this is still a small-scale activity in terms of income and employment, it is an important activity to attract tourists to specific regions. The same applies for complementary activities in for example France, where local gastronomy in ports attracts many tourists to certain regions.

- The seaweeds aquaculture industry also has significant potential. Seaweeds aquaculture is still in the experimental phase while the demand for seaweeds products is increasing. Further stimulation from the EC via for instance the EMFF can speed up developments and increase the maturity of this industry, providing more income and employment opportunities.
- Technology and innovation already play an important role in the fishing industry, where it is increasingly being used to increase the effectiveness and the efficiency of primary activities. This is also seen as an opportunity for the ancillary sector, delivering much of these equipments to fishermen and fish farmers. The EC has the opportunity to further increase the level of technology and innovation by stimulating its use via for instance the EMFF. In the end, this will create opportunities for ancillary companies and will benefit the primary sector significantly.
- Furthermore, the EC can also stimulate the development of initiative related to education. Since the fishing industry – the primary sector and the ancillary sector – is increasingly becoming technology-dependent, higher education levels are being required by companies active in the industry. However, education opportunities that are directly related to fisheries are only available to a limited extent. Investing in these kinds of initiatives, will also attract more younger people to the industry, which is vital given the relatively old age of the workforce in the primary and ancillary industry.

Synthèse

Introduction et méthodologie de l'étude

La présente étude vise à analyser et collecter des données économiques et sociales afin d'aider la DG MARE à évaluer l'impact des futures orientations politiques et de fournir des informations aux décideurs politiques sur l'impact économique et social potentiel des différentes options politiques, ainsi que leur rentabilité.

Dans l'Union européenne, la pêche maritime et l'aquaculture sont des secteurs fortement réglementés. Par conséquent, une quantité considérable de données sont collectées sur le secteur primaire, par exemple les espèces capturées ou produites, l'emploi, les revenus générés et d'autres indicateurs spécifiques au secteur. En revanche, on en sait beaucoup moins sur les activités auxiliaires de la pêche maritime et de l'aquaculture, notamment leur contribution aux économies locales et nationales. La présente étude vise donc à analyser l'importance économique de ces activités, en tenant compte des activités en amont et en aval, jusqu'au premier point de vente.

Par ailleurs, l'étude relève les tendances les plus importantes dans ce secteur et les place dans le contexte des secteurs primaires de la pêche maritime et de l'aquaculture. Afin de mieux cerner les données sous-jacentes, différents segments[5] et sous-secteurs de la pêche maritime et de l'aquaculture ont également été pris en considération, tout comme les données et les tendances clés du secteur complémentaire à la pêche maritime et l'aquaculture, pour évaluer également l'importance économique de ce secteur. Enfin, la présente étude s'est également penchée sur l'importance économique d'autres secteurs étroitement liés à la pêche maritime et l'aquaculture, à savoir la pêche aux coquillages, la pêche continentale, la pêche sous la glace et l'industrie des algues marines.

Alors que les recherches sur la pêche maritime et l'aquaculture étaient axées sur l'importance économique de leur secteur auxiliaire et complémentaire, au vu de leur ampleur, les travaux réalisés sur d'autres secteurs se sont concentrés sur l'importance économique du secteur primaire.

Pour atteindre les objectifs de l'étude, différentes méthodes ont été utilisées. Premièrement, une recherche documentaire a été réalisée pour collecter toutes les données disponibles publiées dans la littérature, les bases de données (commerciales) et d'autres sources pertinentes dans les 28 États membres de l'Union européenne. La recherche documentaire a tenu compte de toutes les langues officielles de l'Union européenne. Deuxièmement, un questionnaire a été envoyé aux organisations pertinentes afin de collecter des données nationales et régionales. Cela a permis de garantir également la collecte de données qui ne sont pas accessibles au public (par exemple la littérature grise). Troisièmement, 73 études de cas ont été réalisées pour obtenir des données quantitatives sur l'emploi, les revenus et les bénéfices, ainsi que des données plus qualitatives portant sur d'autres caractéristiques et tendances socio-économiques (par exemple la répartition hommes/femmes, le travail rémunéré/non rémunéré, les groupes d'âges, les niveaux d'éducation, les qualifications professionnelles et l'expérience professionnelle).

Les données collectées sur le secteur auxiliaire de la pêche maritime et de l'aquaculture ont été extrapolées pour estimer l'importance économique de ce secteur à différents niveaux: l'Union européenne dans son ensemble, les États membres individuels et le niveau régional. Par ailleurs, dans la mesure du possible, des estimations ont été réalisées pour chaque segment et sous-secteur identifiés pour les années 2009 et 2014 afin de cerner l'évolution de ces secteurs au fil du temps.

Enfin, les résultats de l'UE ont été mis en perspective en effectuant une recherche documentaire sur six pays de l'OCDE non membres de l'Union européenne.

Portée de l'étude et définitions utilisées

Étant donné que bon nombre d'activités et de secteurs sont directement ou indirectement liés au secteur primaire de la pêche, il est important de définir clairement l'industrie auxiliaire. Dans la présente étude, toutes les activités *jusqu'au premier point de vente* qui sont directement liées au secteur primaire sont prises en

[5] En ce qui concerne la pêche maritime, trois segments ont été définis: la pêche artisanale, la pêche industrielle et la pêche hauturière. En ce qui concerne l'aquaculture, quatre segments ont été définis: la pisciculture marine, l'aquaculture continentale de la truite, l'aquaculture continentale d'autres espèces et l'aquaculture de bivalves.

compte, et sont par conséquent considérées comme des activités auxiliaires. On peut citer, par exemple, les activités liées à l'entretien des équipements et/ou des navires, les activités liées à la vente de poisson, les fournitures destinées aux opérations et les services de RDI. L'industrie de transformation ne relève pas du champ d'application de la présente étude.

Les activités complémentaires prises en considération sont celles menées par les pêcheurs marins ou les pisciculteurs en plus de leur activité principale, ainsi que celles qui ont remplacé leur activité principale et n'ont aucun lien avec la pêche maritime ou l'aquaculture commerciales (par exemple le pescatourisme, les gardiens de la mer, les services éducatifs, etc.).

Il convient de noter que les services auxiliaires offerts par les entreprises elles-mêmes n'ont pas été pris en considération dans l'évaluation de l'importance économique de l'industrie auxiliaire. En d'autres termes, lorsqu'une entreprise, en plus de ses activités du secteur primaire, assure également l'entretien de ses propres équipements et navires, trie le poisson et assure sa propre gestion, les données relatives à ces activités n'ont pas été incluses. Par ailleurs, la collecte de données s'est concentrée sur des régions ou ports spécifiques au sein de l'UE, et par conséquent, les prestataires de services auxiliaires situés en dehors de l'UE ne relèvent pas du champ d'application de la présente étude.

Le secteur auxiliaire de la pêche maritime

Dans le domaine de la pêche maritime, le secteur primaire employait environ 123 000 ETP et a généré des revenus de quelque 6,8 milliards d'EUR en 2009; et environ 109 000 ETP générant des revenus de quelque 7 milliards d'EUR en 2014. Pour le secteur auxiliaire de la pêche maritime – en tenant compte des activités relevant du champ d'application de la présente étude – les chiffres correspondants étaient de 35 000 ETP et 2,8 milliards d'EUR de revenus en 2009, et 36 000 ETP et 2,5 milliards d'EUR de revenus en 2014. En d'autres termes, le secteur auxiliaire représente environ un tiers de la taille du secteur primaire en termes d'emplois et de revenus générés.

La plupart des emplois et revenus générés dans le secteur auxiliaire concernent l'entretien des équipements et/ou des navires. Cela représente environ 57 % (53 %) de l'emploi (~ 19 500 ETP) et 41 % (44 %) des revenus (~1,1 milliard d'EUR) en 2009 (2014). D'autres sources importantes de revenus et d'emploi sont les activités relatives à la vente de poisson [environ 20 % (24 %) en termes d'emploi et 23 % (25 %) en termes de revenus en 2009 (2014)] et aux fournitures destinées aux opérations [environ 17 % (16 %) de l'emploi et 34 % (28 %) des revenus en 2009 (2014)]. Les services de RDI constituent clairement le sous-secteur le moins représenté de la pêche maritime, représentant environ 7 % (6 %) de l'emploi et seulement 3 % (3 %) des revenus en 2009 (2014).

Si l'on se penche sur la situation de chaque État membre, l'Espagne, l'Italie et la Grèce semblent être les États membres dans lesquels le secteur auxiliaire est le plus important en termes d'emploi (environ 65 % de l'emploi total estimé du secteur auxiliaire). L'Espagne et l'Italie représentent 45 % du montant total estimé des revenus du secteur auxiliaire[6]. Ces États membres sont suivis de près par la France et le Royaume-Uni.

Trois segments distincts ont été recensés dans la pêche maritime, présentant chacun leurs propres caractéristiques: i) la pêche artisanale, ii) la pêche industrielle, et iii) la pêche hauturière. L'emploi secondaire relatif à la pêche artisanale est estimé à environ 15 000 ETP en 2009 et 2014, alors que les revenus sont estimés à 206 millions d'EUR en 2009 et à 303 millions d'EUR en 2014. L'estimation de l'emploi auxiliaire relatif à la pêche industrielle pour les deux années est de 18 500 ETP, générant des revenus d'environ 2,4 milliards d'EUR en 2009 et de 2 milliards d'EUR en 2014. Pour ce qui est de la pêche hauturière, l'emploi auxiliaire est estimé à 2 000 ETP en 2009 et 1 487 ETP en 2014, générant 206 millions d'EUR et 251 millions d'EUR, respectivement. Il apparaît clairement que la pêche hauturière est le plus petit segment dans l'Union européenne, alors que le segment industriel semble employer un nombre légèrement plus élevé d'ETP par rapport à la pêche artisanale.

Les chiffres relatifs à l'emploi dans le secteur auxiliaire sont pour l'essentiel restés stables entre 2009 et 2014, bien que l'emploi du secteur primaire ait fortement diminué au cours de cette période. Ces chiffres indiquent que l'emploi dans le secteur auxiliaire était assez robuste par rapport à l'industrie primaire, c.-à-d. que le secteur auxiliaire ne semble pas touché par une diminution dans le secteur primaire. Il n'en va pas de même

[6] Aucune donnée sur les revenus primaires n'était disponible pour la Grèce, aucune estimation n'a donc pu être réalisée en ce qui concerne le secteur auxiliaire.

des revenus du secteur auxiliaire, où la principale explication de la diminution des revenus de 2,8 milliards d'EUR en 2009 à quelque 2,5 milliards d'EUR en 2014 semble résider dans la combinaison d'une baisse des opportunités de pêche et d'une hausse des frais d'exploitation (principalement due à l'augmentation des prix du carburant entre 2009 et 2014). Par ailleurs, la crise économique survenue dans l'ensemble de l'UE a restreint l'accès au financement et a ralenti les investissements.

De manière générale, cela a exercé une pression sur les revenus des entreprises auxiliaires, sans que cela ne résulte en une baisse du taux d'emploi jusqu'à présent. Deux tendances clés du secteur auxiliaire expliquent ce constat. D'une part, les entreprises auxiliaires tentent de diminuer leur dépendance à la pêche maritime locale en fournissant des services à d'autres régions au sein du même État membre, à d'autres États membres et au reste du monde. D'autre part, elles fournissent des services à d'autres secteurs, tels que l'agriculture et d'autres industries terrestres et offshore (par exemple l'industrie du pétrole et du gaz). Néanmoins, les entreprises auxiliaires sont dans l'ensemble toujours influencées par le secteur primaire de la pêche, bien que dans une moindre mesure.

Une autre tendance de l'industrie auxiliaire est la recherche de l'innovation dans le secteur. L'innovation revêt une importance croissante pour le secteur primaire; de nouvelles obligations légales et le besoin d'efficacité ont renforcé la demande d'équipements techniques et de nouveaux navires plus sûrs et plus efficaces. Cela a également eu un impact sur les entreprises auxiliaires, qui investissent de plus en plus dans les nouvelles technologies pour répondre à cette demande en évolution, et a entraîné des répercussions sur le niveau d'éducation des salariés occupant les postes plus techniques dans le secteur auxiliaire.

Si l'on examine d'autres caractéristiques socio-économiques, la répartition entre les hommes et les femmes montre une dominance d'hommes, reflétant la répartition actuel généralement constaté dans le type de profils d'emploi les plus techniques du secteur auxiliaire. Les emplois semblent pour la plupart être rémunérés. Les seules exceptions ont été constatées dans des entreprises ne fournissant des services auxiliaires qu'à la flotte de pêche artisanale locale. Il s'agit d'entreprises familiales qui se distinguent par la participation active de membres de la famille non rémunérés. Alors que le recours à la main-d'œuvre étrangère est assez important dans le secteur primaire, ce facteur semble l'être moins dans le secteur auxiliaire. La plupart des employés sont des personnes issues des populations locales possédant des années d'expérience professionnelle dans le secteur auxiliaire.

Les secteur primaire et secondaire se voient confrontés au problème du vieillissement de la main-d'œuvre. L'industrie de la pêche - les secteurs primaire et secondaire - semble ne pas avoir beaucoup d'attrait pour les plus jeunes. Les emplois sont physiquement exigeants et les perspectives du secteur dans son ensemble sont incertaines (par exemple chute des opportunités de pêche et incertitude économique en général). Les plus jeunes préfèrent chercher un poste dans des industries qui offrent des emplois «plus sûrs». Cette situation pourrait changer. Des programmes d'enseignement professionnel sont mis en place et l'industrie en générale dépend de plus en plus des technologies. Par conséquent, les niveaux d'éducation demandés dans l'industrie augmentent, parce que cette dernière exige des connaissances plus approfondies des (nouvelles) technologies.

Le secteur auxiliaire de l'aquaculture

Le secteur auxiliaire de l'aquaculture a employé quelque 19 000 ETP en 2009 et 24 500 ETP en 2014, et généré 2,8 milliards d'EUR en 2014[7]. Le segment le plus important en termes d'emploi était l'aquaculture continentale des «autres espèces» (c'est-à-dire toute l'aquaculture continentale à l'exception de la truite). Celle-ci a créé plus de la moitié de tous les emplois auxiliaires en 2014.

Lorsque l'on se penche sur la répartition de l'emploi entre les différents sous-secteurs identifiés dans l'aquaculture, trois sous-secteurs ont chacun créé environ 30 % des emplois auxiliaires, à savoir les activités relatives à l'entretien des équipements et/ou des navires, les fournitures destinées aux opérations et les activités relatives à la vente de poisson. Traditionnellement, l'alimentation est l'une des activités auxiliaires les plus importantes dans l'aquaculture. C'est pourquoi les activités relatives aux fournitures destinées aux opérations sont si importantes, également en termes de revenus: environ la moitié des revenus totaux générés est liée à ces activités.

En ce qui concerne les activités liées à l'entretien des équipements et/ou des navires, l'emploi semble avoir plus que doublé en 2014 par rapport à 2009. L'explication semble être que de plus en plus d'établissements

[7] Malheureusement, trop peu de données étaient disponibles pour procéder à une estimation fiable pour 2009.

aquacoles manquent d'équipements spécialisés et hautement techniques, ce qui entraîne une hausse de l'emploi dans ce sous-secteur.

Si l'on se penche sur la situation de chaque État membre, il est clair que le Royaume-Uni, l'Italie et l'Espagne sont ceux présentant les taux d'emploi et les niveaux de revenus les plus élevés dans le secteur auxiliaire de l'aquaculture. En termes de revenus, la Grèce est également un État membre important. Il est estimé que le taux global de travail à temps partiel dans ce secteur se situe entre 0,1 et 0,2, ce qui indique qu'il y a beaucoup plus d'emplois à temps plein dans le secteur auxiliaire que dans le secteur primaire de l'aquaculture, où le taux de travail à temps partiel est d'environ 0,5. Le travail dans le secteur auxiliaire est beaucoup moins saisonnier et il est dès lors plus facile de planifier et de conserver un nombre stable de salariés. Le fait que les entreprises auxiliaires ont diversifié leurs activités dans de nombreux autres secteurs fournit également une base plus solide pour des opportunités d'emploi à temps plein.

La répartition entre les salariés hommes et femmes dans le secteur auxiliaire semble être égale dans les activités liées aux services de RDI et les activités de pré-vente, alors que pour les activités liées à l'entretien des équipements et/ou des navires et aux fournitures destinées aux opérations, les postes sont pour la plupart occupés par des hommes. Cela peut s'expliquer en grande partie par la nature du travail. L'entretien des équipements et/ou des navires et les activités liées aux fournitures destinées aux opérations exigent plus de force physique et sont dès lors généralement effectués par des hommes. La plupart des services auxiliaires sont fournis au niveau local et la majorité de la main-d'œuvre dans les services auxiliaires est composée de travailleurs issus de la population locale.

En ce qui concerne la rentabilité de ce secteur, la plupart des services semblent être rentables. Le niveau de rentabilité dépend toutefois du type de service. La production et la fourniture d'aliments (domaine dans lequel il existe une concurrence accrue) et l'approvisionnement en carburant (une matière première) affichent de faibles taux de profit de 2 à 4 %. Des taux de profit plus important sont constatés dans les fournitures d'équipements techniques, où les entreprises affichent des profits de 10 à 30 %.

Traditionnellement, la majorité des salariés dans les secteurs primaire et auxiliaire ont un faible niveau d'éducation. Alors que le processus de production dans l'aquaculture devient de plus en plus sophistiqué d'un point de vue technologique, davantage de technologies étant nécessaires pour se conformer aux obligations légales (environnementales) plus strictes et pour satisfaire le désir de produire de manière plus efficace, un savoir-faire plus technique est requis dans l'industrie auxiliaire. Cela a déjà entraîné l'augmentation des niveaux d'éducation ces dernières années. La plupart des emplois dans ce secteur constituent un bon point de départ pour les jeunes qui n'ont qu'une expérience professionnelle limitée, voire aucune. Alors que la plupart des services sont hautement spécialisés, jusqu'à récemment, aucun programme éducatif ne ciblait les secteurs primaire et auxiliaire de l'aquaculture. Par conséquent, l'apprentissage et l'expérience professionnelle ne pouvaient être acquis que sur le terrain.

Il existe un certain nombre de tendances importantes dans l'industrie auxiliaire. Premièrement, l'industrie auxiliaire est davantage spécialisée dans les services nécessitant une expertise technique, comme les activités liées à l'entretien des équipements et des installations d'aquaculture. Ce sont principalement les plus grandes entreprises, opérant souvent à l'échelle européenne ou mondiale, qui fournissent ces services spécialisés. Elles peuvent se permettre d'investir en permanence et d'innover. Ces entreprises ont diversifié le nombre de régions qu'elles desservent. Deuxièmement, les fournisseurs auxiliaires d'aliments ont tendance à être des entreprises de plus grande envergure. Les économies d'échelle constituent le moteur de la croissance et ces entreprises opèrent également à l'échelle européenne et même mondiale. Troisièmement, les entreprises qui fournissent les services auxiliaires au niveau local, comme les activités de pré-vente, l'entretien et les réparations, tendent à diversifier leurs activités à d'autres secteurs, dans le but de réduire leur dépendance globale à l'industrie de l'aquaculture, dans laquelle de nombreuses entreprises auxiliaires semblent désormais servir d'autres secteurs, tels que l'agriculture, le secteur de la construction ou même le tourisme. L'effet final de cette diversification dans d'autres régions et secteurs rendent le secteur auxiliaire plus résistant aux crises qui surviennent dans le secteur primaire de l'aquaculture.

Activités complémentaires

Les activités complémentaires sont celles menées par des (anciens) pêcheurs ou pisciculteurs en plus de leur activité principale ainsi que les activités de ceux qui ont remplacé leur activité principale et n'ont aucun lien commercial avec la pêche maritime ou l'aquaculture commerciale. De nombreux projets ont reçu le soutien du Fonds européen pour la pêche (FEP) pour se diversifier en dehors de l'industrie. Trente projets financés au titre

du FEP ont été recensés et ont généré au moins 64 emplois[8]. On estime qu'il y aurait en réalité beaucoup plus de projets, étant donné que tous n'ont pas été diffusés aussi largement que ceux inclus dans la présente étude. Par conséquent, l'impact des projets financés dans le cadre du FEP peut être plus important que ce que les chiffres ne laissent à penser.

Néanmoins, de manière générale, le secteur complémentaire à la pêche maritime et à l'aquaculture ne revêt qu'une importance économique limitée par rapport au secteur primaire et au secteur auxiliaire. En fait, les activités ne sont souvent pas organisées de manière professionnelle. Elles semblent effectivement générer des revenus, mais ceux-ci restent marginaux, tant pour l'aquaculture que pour la pêche maritime. L'emploi est également limité, étant donné que la plupart des activités sont exercées par les pêcheurs ou les pisciculteurs eux-mêmes sans engager d'employés supplémentaires. Ces activités semblent pourtant connaître une lente croissance avec le temps, et certains pisciculteurs et pêcheurs estiment que les activités complémentaires constituent une source de revenus (additionnels) bienvenue.

En ce qui concerne plus particulièrement l'aquaculture, les activités complémentaires tendent à être principalement lancées par les entreprises d'aquaculture elles-mêmes. Ces activités impliquent principalement l'essai du produit, au moyen de visites guidées, de dégustations, de restaurants et de boutiques locales. Dans la pêche maritime, la plupart des activités complémentaires impliquent des visites guidées et des sorties de pêche.

Autres secteurs

Durant cette étude, quatre autres (plus petits) secteurs étroitement liés à la pêche maritime et l'aquaculture ont fait l'objet de recherches (à savoir la pêche continentale, la pêche sous la glace, la pêche aux coquillages et l'industrie des algues marines). De manière générale, ces recherches fournissent une meilleure vue d'ensemble de l'importance économique de l'industrie primaire de ces secteurs dans l'Union européenne.

Pêche continentale

La pêche continentale commerciale connaît un déclin depuis les années 1980. En 2015, entre 14 000 et 15 000 navires pratiquaient la pêche continentale commerciale. Le volume total des captures est estimé à 35 000 tonnes (1 % de la production totale de produits européens issus de la pêche), générant 100-110 millions d'EUR (1-2 % de la valeur totale des débarquements de l'UE). Ce secteur emploie quelque 17 100 pêcheurs pratiquant la pêche continentale commerciale au sein de l'UE (l'équivalent d'environ 13 % du nombre total de pêcheurs dans l'Union européenne).

La plupart des pêches continentales semblent satisfaire la demande traditionnelle locale et les niches de marché, et apportent souvent une valeur culturelle aux communautés locales. La Roumanie, la Bulgarie, l'Italie et le Royaume-Uni semblent afficher les taux d'emploi les plus élevés dans le secteur (sur la base des données de 2011). Les obligations légales peuvent avoir un impact particulièrement important sur l'attractivité du secteur. La Hongrie va interdire la pêche continentale, alors que la Finlande réglemente la longueur minimale des poissons capturés.

Pêche sous la glace

La pêche sous la glace est une activité populaire lorsque la glace couvre les zones de pêche habituelles des grands lacs et fleuves. La pêche sous la glace est principalement pratiquée dans le Nord de l'Europe, et plus particulièrement dans les États baltes, la Finlande et la Suède, dans la période de novembre à mars. Il s'agit à la fois d'une activité commerciale et d'une activité touristique/récréative, cette dernière étant la plus importante. Peu d'activités commerciales significatives de pêche sous la glace ont été relevées. L'importance de la pêche sous la glace en tant qu'activité récréative devrait toutefois augmenter à l'avenir.

L'industrie des algues marines

L'Europe ne joue qu'un rôle mineur dans l'industrie des algues marines. La production est restée stable, en se maintenant au-dessus de 350 000 tonnes, jusqu'en 2000, et enregistre une baisse depuis lors.

L'industrie européenne des algues marines consiste en la récolte (mécanique et manuelle) et l'aquaculture d'algues marines. La France et l'Irlande dominent la récolte mécanique européenne d'algues marines. En

[8] Cependant, tous les projets ne se penchent pas sur les emplois créés.

Espagne, cette récolte se fait manuellement. L'aquaculture des algues marines en est à un stade expérimental dans l'Union européenne, avec de faibles volumes et une résistance des communautés (locales).

Cependant, de manière générale, une croissance de la récolte sauvage et de l'aquaculture est possible, car il existe un sous-approvisionnement d'algues marines en Europe. On ignore encore si cette demande croissante stimulera effectivement la production européenne ou les importations.

Pêche aux coquillages

Les coquillages sont collectés dans des zones intertidales (zones côtières) et dans les fleuves ou les lacs, à des fins tant commerciales que récréatives. Cette activité s'exerce principalement en Espagne, au Portugal, en France, aux Pays-Bas, au Danemark et au Royaume-Uni. Les principales espèces récoltées sont l'ormeau, la palourde, la coque, le crabe, l'écrevisse, le homard, la moule, l'huître, et le pétoncle. En ce qui concerne plus particulièrement l'Espagne, on estime que le secteur emploie quelques milliers de pêcheurs de coquillages travaillant à pieds. Dans d'autres pays, la pêche aux coquillages génère beaucoup moins d'emplois.

Aux Pays-Bas et en Andalousie, en Espagne, ces pêcheurs sont principalement des hommes. Dans la région espagnole de Galice, plus de 90 % sont des femmes, souvent des femmes de pêcheurs, qui pêchent les coquillages à pieds, alors que les hommes travaillent sur des navires de petite taille.

De manière générale, la pêche aux coquillages est importante pour les communautés locales spécifiques, mais l'importance économique de ce secteur est limitée, tant en termes de revenus que d'emplois générés.

Autres pays de l'OCDE

Pour mettre les résultats relatifs au secteur auxiliaire dans l'Union européenne en perspective, une comparaison a également été réalisée avec six pays de l'OCDE (le Canada, l'Islande, le Japon, la Nouvelle-Zélande, la Norvège et les États-Unis). Les résultats étaient conformes à ceux de la recherche documentaire dans l'Union européenne; les multiplicateurs d'emploi et des revenus auxiliaires semblent se situer entre 0,5 et 1,0, tant dans la pêche maritime que l'aquaculture (c'est-à-dire qu'on estime qu'un pêcheur ou pisciculteur actif dans l'industrie primaire génère entre 0,5 et 1 ETP dans les secteurs auxiliaires de la pêche maritime et de l'aquaculture). Bien qu'ils soient légèrement plus élevés que ceux trouvés dans les études de cas, ces multiplicateurs sont similaires aux résultats de la recherche documentaire sur l'Union européenne. La différence semble être principalement le résultat de différences au niveau des méthodes et des définitions appliquées durant la recherche des multiplicateurs. Cela semble particulièrement vrai pour les activités en aval, où la définition semble aller au-delà du premier point de vente (par exemple la vente au détail, la transformation secondaire, etc.), alors que la présente étude ne dépasse pas le premier point de vente.

Les multiplicateurs dans l'aquaculture semblent être plus élevés que ceux constatés dans la pêche maritime, bien que la différence soit minime. Cette conclusion est également cohérente par rapport aux résultats collectés dans l'Union européenne. En termes de dépendance et de résistance globale du secteur auxiliaire par rapport au secteur primaire, les résultats semblent également conformes à ceux collectés dans l'Union européenne. Dans certaines communautés locales, la dépendance à l'industrie primaire peut être assez importante, mais celle-ci diminue lorsque les services peuvent être facilement transférés à d'autres secteurs, régions ou pays.

Utilité des résultats de l'étude et recommandations

L'étude donne un aperçu de l'importance économique du *secteur auxiliaire de la pêche maritime et de l'aquaculture*. Elle fournit des estimations quant au nombre d'emplois et aux revenus générés dans ce secteur, ainsi que dans ses sous-secteurs et segments, au niveau régional, des États membres et de l'UE. De manière générale, ces chiffres quantitatifs peuvent être utilisés pour améliorer les évaluations de l'efficacité des subventions du Fonds européen pour les affaires maritimes et la pêche en ce qui concerne la pêche maritime et l'aquaculture.

Pour ce qui est des quatre autres (plus petits) secteurs, à savoir la pêche sous la glace, la pêche continentale, l'industrie des algues marines et la pêche aux coquillages, l'étude donne un aperçu de l'importance économique du *secteur primaire*. Bien que peu de données quantitatives et qualitatives soient disponibles pour ces secteurs, l'étude fournit des estimations. Elle a identifié un potentiel de développement pour l'industrie des algues marines, étant donné que la demande augmente dans l'UE.

Enfin, la présente étude a également examiné l'importance économique des activités complémentaires à la pêche maritime et à l'aquaculture menées par des (anciens) pêcheurs et pisciculteurs. Il s'est avéré difficile de rassembler des données sur cette industrie, celles-ci étant pour la plupart collectées dans le cadre des statistiques plus larges du tourisme avec peu de liens, voire aucun, avec la pêche maritime et l'aquaculture. Néanmoins, sur la base des éléments anecdotiques réunis, ce secteur complémentaire semble s'élargir. Davantage de pêcheurs ont conscience du potentiel des voyages touristiques comme complément à leurs activités de pêche. Dans l'aquaculture également, de plus en plus de pisciculteurs participent à des activités touristiques ou de promotion du poisson, bien qu'à une petite échelle. Dans l'ensemble, ces activités ne semblent toujours pas générer beaucoup d'emplois ou de revenus supplémentaires, étant donné qu'elles sont exercées en tant qu'activités de promotion par les pêcheurs ou les établissements d'aquaculture eux-mêmes. Dès lors, malgré le potentiel de l'industrie, son importance économique est toujours limitée.

En général, les activités auxiliaires relatives à la pêche – la pêche maritime ou l'aquaculture – dépendent toujours en grande partie des secteurs primaires relevant du champ d'application de la présente étude. Par conséquent, il est recommandé que les décideurs politiques tiennent toujours compte des activités auxiliaires lorsqu'ils prennent des décisions affectant le secteur primaire. De cette manière, tous les effets d'une décision sur l'entièreté de la chaîne d'approvisionnement sont pris en considération. De même, il serait également recommandé de collecter des données relatives aux secteurs auxiliaires sur une base plus structurelle. De manière générale, la collecte de données sur le secteur auxiliaire est toujours limitée, alors qu'elle pourrait apporter une valeur importante au processus d'élaboration des politiques. Par conséquent, la collecte de données par les gouvernements locaux ou régionaux devrait être mieux équipée pour faciliter le processus décisionnel sur les données collectées dans les secteurs primaire et auxiliaire.

Outre ce qui précède, quelques recommandations plus spécifiques peuvent être formulées à la suite de la présente étude.

- Le secteur complémentaire à la pêche et à l'aquaculture présente un fort potentiel. Certaines initiatives locales, et en particulier celles relatives au tourisme, ont déjà créé une valeur significative pour les communautés locales. Certaines de ces initiatives ont été financées par le FEP au cours de la période 2007-2013, mais la CE peut renforcer l'utilisation du FEAMP pour ces initiatives pour la période 2014-2020 et les prendre en considération dans le cadre d'instruments financiers futurs, le cas échéant. Les activités complémentaires créent des opportunités d'emploi et de revenus pour les femmes, qui sont principalement actives dans cette industrie. En même temps, ces activités complémentaires fournissent également plus de revenus et d'emplois dans d'autres secteurs (touristiques). La pêche sous la glace en est un exemple. Bien qu'il s'agisse toujours d'une activité à petite échelle, en termes de revenus et d'emplois, elle constitue une activité importante pour attirer les touristes dans des régions spécifiques. Il en va de même pour les activités complémentaires en France, par exemple, où la gastronomie locale dans les ports attire de nombreux touristes dans ces régions.
- L'industrie de l'aquaculture des algues marines présente également un potentiel important. L'aquaculture des algues marines est toujours à un stade expérimental, alors que la demande de produits à base d'algues marines augmente. Une stimulation supplémentaire de la part de la CE via, par exemple, le FEAMP, peut accélérer les développements et augmenter la maturité de l'industrie, en fournissant davantage d'opportunités d'emplois et de revenus.
- La technologie et l'innovation jouent déjà un rôle important dans l'industrie de la pêche, où elles sont de plus en plus utilisées pour renforcer l'efficacité et l'efficience des activités primaires. Cela est également perçu comme une opportunité pour le secteur auxiliaire, qui fournit une grande partie de ces équipements aux pêcheurs et pisciculteurs. La CE a l'opportunité de renforcer le niveau de technologie et d'innovation en stimulant leur utilisation, notamment via le FEAMP. Enfin, cela créera des opportunités pour les entreprises auxiliaires et profitera fortement au secteur primaire.
- Par ailleurs, la CE peut également stimuler le développement d'initiatives relatives à l'éducation. L'industrie de la pêche – le secteur primaire et le secteur auxiliaire – dépendant de plus en plus des technologies, des niveaux d'éducation plus élevés sont requis par les entreprises actives dans l'industrie. Cependant, les opportunités d'éducation directement liées à la pêche ne sont disponibles que dans une mesure limitée. Des investissements dans ce type d'initiatives attireront également les jeunes vers l'industrie, ce qui est essentiel vu de l'âge relativement élevé de la main-d'œuvre dans l'industrie primaire et auxiliaire.

Resumen

Introducción y metodología de estudio

El objetivo de este trabajo es la recopilación y el análisis de datos socioeconómicos con el objeto de asesorar a la DG MARE en la evaluación del impacto al aplicar nuevas políticas. Igualmente, este estudio proporciona la información necesaria para que la toma de decisiones sobre distintas opciones de gestión tenga en cuenta el impacto socioeconómico y el análisis coste-beneficio de cada una de ellas.

En la Unión Europea, tanto la pesca marítima como la acuicultura son sectores severamente regulados. En consecuencia, se han recopilado ya importantes cantidades de datos primarios, por ejemplo cuáles son las especies capturadas o producidas, el empleo e ingresos generados y otros indicadores específicos del sector. Sin embargo, no existe tanta información en el caso de las actividades auxiliares dependientes de la pesca marítima y de la acuicultura, tampoco sobre su contribución a la economía a nivel local o nacional. Este trabajo analiza la importancia económica de estas actividades hasta que se produce la primera venta, en sentido tanto ascendente como descendente.

Además se identifican las tendencias más importantes de las actividades auxiliares en el contexto de la pesca marítima y de la acuicultura. Para interpretar la información subyacente y poder evaluar correctamente la importancia económica del sector, se tuvieron en cuenta cada uno de los distintos segmentos[9] y subsectores, así como las tendencias del sector de actividades complementarias a la pesca marítima y a la acuicultura. Finalmente, este trabajo aborda también la importancia económica de sectores muy próximos a la pesca marítima y a la acuicultura, como son el marisqueo, la pesca continental, la pesca en hielo y la industria de las algas.

Atendiendo a la mayor importancia de la pesca marítima y de la acuicultura, se ha profundizado más en la investigación de las actividades auxiliares de estos sectores, mientras que para el resto el trabajo se ha centrado principalmente en la importancia económica del propio sector primario.

Para cumplir los objetivos del estudio se ha usado diversas metodologías. Primero el trabajo se centró en un estudio de gabinete sobre la información pública disponible en la literatura, bases de datos (comerciales) y otras fuentes de datos relevantes en los 28 estados miembros de la Unión Europea. El estudio de gabinete se realizó en todos los idiomas de la Unión. Seguidamente, se procedió al envío de cuestionarios a entidades interesadas para la recopilación de información a nivel nacional y regional. Este trabajo de campo proporcionó la adquisición de información no publicada (por ejemplo la denominada documentación gris). Tercero, se realizaron 73 casos de estudio para obtener información cuantitativa de empleo, ingresos y tasas de beneficio, así como información más cualitativa sobre otros aspectos socioeconómicos (por ejemplo, ratios de género, remuneración, clases de edad, niveles de formación) y tendencias.

La información recopilada sobre las actividades indirectas a la pesca marítima y la acuicultura fue extrapolada para estimar la importancia económica del sector a distintos niveles: la Unión Europea en su conjunto, a nivel estado miembro y a nivel regional. Adicionalmente y, siempre que ha sido posible, las estimaciones se refieren a los años 2009 y 2014, con el objeto de obtener una idea de la evolución temporal de ambos sectores.

Finalmente, se ha evaluado el alcance de los resultados obtenidos mas allá de la UE mediante la realización de un estudio comparativo en seis países de la OCDE.

Alcance del estudio y definiciones utilizadas

Ante la existencia de muchas actividades y sectores directa e indirectamente ligados a la industria pesquera, es crucial definir claramente lo que se entiende por actividades auxiliares. En este trabajo, se han considerado como actividades auxiliares todas aquellas actividades directamente relacionadas con el sector primario que se realicen hasta el momento de la primera venta. Como ejemplo de estas actividades cabe citar las relativas a la prestación de servicios y/o mantenimiento de los buques, los suministros y equipamiento para la actividad pesquera o acuícola, las actividades relacionadas con la primera venta de los productos de la pesca y los

[9] Para la pesca marítima se han definido tres segmentos: pesca artesanal, pesca industrial y pesca de larga distancia. Para la acuicultura se han definido cuatro segmentos: piscicultura marina, acuicultura continental de truchas, acuicultura continental de otras especies y cultivo de bivalvos.

servicios de I+D+i. La industria de transformación de los productos de la pesca no se ha incluido en el objeto de estudio.

En lo referente a actividades complementarias, se han tenido en cuenta aquellas actividades llevadas a cabo por pescadores o acuicultores además de su actividad principal así como las que han reemplazado dicha actividad principal y que no tienen relación alguna con la pesca marítima y la acuicultura (por ejemplo pesca-turismo, guardianes del mar, servicios educacionales, etcétera).

Merece la pena señalar que los servicios auxiliares provistos por las propias empresas no se han tenido en cuenta para calcular la importancia económica de la industria que realiza las actividades auxiliares. En otras palabras, si una misma compañía además de su contribución al sector primario presta servicios como la provisión de equipos y suministros a buques, la clasificación de los productos antes de la venta y la gestión de sus propias actividades, estos servicios no se han tenido en cuenta en la elaboración de los cálculos. Más aún, la recopilación de datos se ha centrado en puertos y regiones específicos de la UE y, por tanto, los proveedores de servicios y actividades indirectas de empresas con base fuera del territorio UE van más allá del alcance de este trabajo.

El sector de las actividades auxiliares a la pesca marítima

En pesca marítima, el sector primario empleó a 123.000 FTE y generó en torno a 6,8 billones de Euros de ingresos en 2009 y cerca de 109.000 FTE y 7.0 billones de Euros en 2014. El sector de las actividades auxiliares a la pesca marítima –considerando la definición de actividades auxiliares empleada en el presente estudio- generó 35.000 FTE y 2,8 billones de Euros de ingresos en 2009 y 36.000 FTE y 2,5 billones de ingresos en 2014. En otras palabras, la importancia del sector de actividades auxiliares es alrededor de un tercio de la importancia del sector primario en términos de empleo e ingresos generados.

La mayor parte del empleo generado por las actividades auxiliares se refiere a servicios a los barcos y equipamiento. Esto alcanza en torno al 57% (53%) del empleo (~19.500 FTE) y al 41% (44%) de los ingresos en (~ 1,1 billones de Euros) en 2009 (2014). Otras fuentes de ingresos y empleo importantes son las provenientes de las operaciones de primera venta de los productos de la pesca (sobre el 20% (24%) en términos de empleo y el 23% (25%) en términos de ingresos en 2009 (2014)) y operaciones de suministro (sobre el17% (16%) del empleo y el 34% (28%) de los ingresos en 2009 (2014)). Los servicios de I+D+i están claramente menos representados en el subsector de la pesca marítima, alcanzando en torno al 7% (6%) del empleo y solamente alrededor del 3% (3%) de los ingresos en 2009 (2014).

Si miramos por países, donde se genera mas empleo es en España, Italia y Grecia (en torno al 65% del total estimado para el sector de actividades auxiliares). España e Italia suponen un total del 45% de los ingresos[10]. Les siguen muy de cerca Francia y el Reino Unido.

En base a las distintas especificidades se identificaron tres segmentos diferentes en la pesca marítima: i) la pesca artesanal, ii) la pesca industrial y iii) la pesca de larga distancia. El empleo relativo a la pesca artesanal se estima en unos 15.000 FTE tanto en 2009 como en 2014, mientras que los ingresos generados fueron de unos 206 millones de Euros en 2009 y de 303 millones de Euros en 2014. El empleo generado por la pesca industrial es en ambos años de 18.500 FTE, generando en torno a 2,4 billones de ingresos en 2009 y 2,0 billones de Euros en 2014. La pesca de larga distancia empleó a unos 2.000 FTE en 2009 y a 1.487 FTE en 2014, generando 206 y 251 millones de Euros respectivamente. Claramente, los buques de larga distancia son el segmento de flota de menor importancia en la Unión Europea, mientras que la flota industrial, seguido muy de cerca por la pesca artesanal, se presenta como el segmento que más empleo e ingresos auxiliares genera.

En cifras generales, el empleo generado por el sector de las actividades auxiliares se mantuvo estable en 2009 y 2014, aunque el empleo del sector primario disminuyó significativamente en ese periodo. Este resultado es una muestra de la resiliencia del sector de las actividades auxiliares respecto al sector primario, esto es, el retroceso del sector primario no parece haber afectado a la industria de las actividades auxiliares. Contrariamente, no ocurre lo mismo con los ingresos, pues el descenso registrado en los ingresos de las actividades auxiliares desde unos 2,8 billones en 2009 a unos 2,5 billones en 2014, parece responder a la combinación del descenso de las oportunidades de pesca y al incremento de los gastos corrientes

[10] No pudieron obtenerse datos de ingresos del sector primario en Grecia, con el consiguiente agravio para el cálculo de los ingresos en el sector de las actividades indirectas.

(principalmente debido a la subida del precio del carburante entre 2009 and 2014). Cabe agregar que la crisis económica en la UE ha dificultado el acceso a la financiación y la disminución de las inversiones.

La situación descrita refleja que los ingresos de las empresas proveedoras de servicios y actividades auxiliares, aun estando bajo presión, no reflejan una perdida notable de empleo. De este análisis resultan dos tendencias claras en el sector de las actividades auxiliares. De un lado, las empresas tratan de reducir su dependencia del sector pesquero local, extendiendo su oferta de servicios a otras regiones del mismo estado miembro o mas allá, dentro y fuera de la UE. Por otro lado, las empresas están diversificando su oferta, prestando servicios a otros sectores como son la agricultura o industrias offshore (por ejemplo las del gas o el petróleo). En general, las empresas que proveen actividades auxiliares siguen aún influenciadas por lo que le suceda al sector primario, pero en menor medida de lo esperado.

En relación con la industria de la innovación se ve otra tendencia clara. La importancia de la innovación en el sector primario va en incremento en los últimos años; la existencia de nuevos requisitos legales supone la adquisición de nuevos equipos y requiere de buques cada vez mas eficientes y seguros. Esto es algo que ha quedado claro en el estudio pues las empresas invierten cada vez más en tecnología de acuerdo a las nuevas demandas. También hay consecuencias a nivel educativo del personal contratado, que ahora debe tener mejores capacidades técnicas orientadas a las necesidades del sector.

Mirando a otras características socioeconómicas, la distribución por géneros se inclina a favor de los varones, si bien el balance se nota en aquellos trabajos de índole técnica del sector de actividades indirectas. Los trabajos son mayoritariamente remunerados, con la única excepción de los proveedores de servicios auxiliares a la flota artesanal. Los proveedores de este segmento suelen ser empresas familiares sin remuneración alguna. Mientras que en el sector primario es habitual el empleo de no nacionales, rara vez se detecta esta circunstancia en las empresas de las actividades auxiliares. La mayoría de los empleados son de la localidad con años de experiencia trabajando en el sector.

Tanto el sector primario como el de actividades auxiliares sufre el envejecimiento del personal. La industria de la pesca -sector primario y sector de actividades auxiliares- parece ser poco apetecible para los jóvenes. El trabajo es físicamente muy exigente y las perspectivas para el sector en su conjunto son inciertas (por ejemplo, la falta de oportunidades de pesca y la incertidumbre económica en general) La gente joven prefiere la búsqueda de empleo en otros sectores mas 'seguros', situación que sin embargo puede cambiar. Se han de establecer programas educativos específicos pues la industria es cada vez mas dependiente de la tecnología. Con ello, los niveles educativos que la industria demanda son más elevados al requerirse un mayor conocimiento de nuevas tecnologías.

El sector de las actividades auxiliares a la acuicultura

En 2009 y 2014, el sector de las actividades auxiliares dependientes de la acuicultura empleó a unos 19.000 y 24.500 FTE respectivamente, generando 2,8 billones de Euros en 2014[11]. El segmento más importante en términos de empleo fue el de la acuicultura continental para 'otras especies' (es decir, toda la acuicultura continental excepto la dedicada al cultivo de trucha). El empleo generado por este segmento fue la mitad del generado por el total del sector de las actividades auxiliares a la acuicultura en 2014.

Respecto a la importancia del empleo en los distintos subsectores identificados en acuicultura, solo tres subsectores suponen en torno al 30% cada una del empleo generado que son las empresas proveedoras de servicios, las proveedoras de suministros y las actividades relacionadas con la primera venta de los productos de la acuicultura. Tradicionalmente, el suministro de pienso (alimentación) es la actividad auxiliar más importante para la acuicultura y, por ello, las actividades relacionadas con el suministro son también las más importantes en términos de ingresos. Así, en torno a la mitad de los ingresos totales del sector de las actividades auxiliares proviene de las actividades de suministro.

Las actividades que proveen servicios y equipamiento se han doblado entre 2009 y 2014. La explicación se debe a que cada vez hay mas empresas acuícolas buscando mejor equipamiento técnico y especializado, lo que conlleva a un incremento en el empleo de este subsector.

Observando el comportamiento por países, Reino Unido, Italia y España dominan claramente los niveles de empleo e ingresos en el sector a cargo de las actividades auxiliares y Grecia debe ser también destacado

[11] Lamentablemente se dispuso de muy poca información para poder obtener estimaciones fiables de lo ocurrido en 2009

considerando únicamente los ingresos. El ratio general de este sector entre empleo temporal y permanente se estima en 0,1-0,2, indicando que la mayor parte del empleo es a jornada completa en el sector de actividades auxiliares, a diferencia de lo que ocurre en sector primario acuícola, donde el empleo a tiempo parcial alcanza en torno al 0,5. El trabajo en las actividades auxiliares es también mucho menos estacional siendo más fácil de planificar y de garantizar un empleo más estable. El hecho de que las empresas proveedoras de servicios auxiliares hayan diversificado sus actividades en otros muchos sectores, proporciona también una sólida base para el trabajo a tiempo completo.

La distribución por géneros en el sector de actividades auxiliares muestra un balance en los empleados de I+D+i y actividades de pre-venta, mientras que en las actividades de servicio y equipamientos y en las de suministro, el empleo lo realizan fundamentalmente varones. La explicación se encuentra claramente en la naturaleza del trabajo. Las actividades de servicio, equipamientos y las de suministro requieren ciertas condiciones de fuerza física y tradicionalmente han sido desarrolladas por hombres. La mayoría de los servicios se realizan localmente y, por ello, la mayoría del personal del sector es local.

En cuanto a la rentabilidad, la mayoría de los servicios del sector parecen ser rentables. Sin embargo, la rentabilidad depende del tipo de servicio. Así, la producción y suministro de piensos (donde cada vez hay más competencia) y el suministro de carburantes tienen bajas de tasas de beneficios 2-4%. Mientras que para el suministro de equipamientos técnicos las tasas de beneficio alcanzan el 10-30%.

Históricamente, la mayoría de los empleados en ambos sectores el primario y el proveedor de actividades auxiliares mostraban niveles educativos bastante bajos. Como el proceso productivo dentro de la acuicultura se ha sofisticado, con mayores necesidades tecnológicas para cumplir los cada vez más estrictos requisitos legales (ambientales) y para producir más eficientemente, el sector auxiliar requiere también de mayor conocimiento técnico. Esto ya ha originado que los niveles educativos en los últimos años sean más altos. Los jóvenes ven así una oportunidad de empleo en este sector, pudiendo empezar a trabajar sin necesidad de demostrar experiencia previa. A pesar de que muchos de los servicios están altamente especializados, hasta hace poco no existían programas educativos específicos dirigidos al sector primario y al proveedor de servicios auxiliares, de manera que el conocimiento se ha adquirido al tiempo que se trabajaba en el sector.

A partir de este estudio se han constatado una serie de importantes tendencias en el sector de las actividades auxiliares a la acuicultura. Primero se ha encontrado que hay más demanda de especialistas en servicios que requieren conocimientos tecnológicos, como las actividades relativas al equipamiento e instalaciones acuícolas. Esta actividad la desarrollan principalmente grandes compañías que proveen servicios especializados a menudo operando en toda Europa o a mayor escala. Este tipo de empresas puede asumir fuertes inversiones y gastos en innovación. Las empresas han diversificado regionalmente su actividad. Una segunda tendencia es que las empresas dedicadas a piensos son cada vez mayores. Las economías de escala dirigen esta evolución, operando también en toda Europa y a escala global. Una tercera tendencia compete a las empresas proveedoras de servicios a nivel local, como las actividades de pre-venta, mantenimiento y reparación que muestran claras señales de diversificación a otros sectores. Este comportamiento pretende disminuir la dependencia exclusiva de la acuicultura, donde muchas empresas parecen ahora ver la manera de servir a otros sectores como la agricultura, la construcción o incluso el turismo. El efecto de esta diversificación en otros servicios y regiones hace de las actividades auxiliares a la acuicultura un sector más resiliente con respecto a lo acontecido en el sector primario

Actividades complementarias

Se denominan actividades complementarias aquellas que realizan los (ex)pescadores o (ex)acuicultores además de su actividad principal, así como otras actividades que la sustituyan, que nada tengan que ver con la pesca o la acuicultura. Muchos proyectos han recibido financiación del Fondo Europeo de la Pesca (FEP) en apoyo de la diversificación de la industria. Se identificaron un total de 30 proyectos con apoyo del FEP que han generado al menos 64 puestos de trabajo[12]. En realidad se supone que existen más proyectos a parte de los analizados por este estudio, pero como no siguieron los mismos patrones de comunicación que los estudiados no se han podido contabilizar. Por tanto, el impacto del FEP puede ser mayor que el que sugieren las cifras presentadas.

En general, el sector de las actividades complementarias a la pesca marítima y a la acuicultura es de importancia limitada en relación al sector primario y al sector de actividades auxiliares. De hecho es un sector

[12] Sin embargo, no todos los proyectos suponen la creación de empleo.

que no esta aún organizado profesionalmente. Parece estar generando ingresos, pero esto sucede marginalmente tanto en la pesca marítima como en la acuicultura. El estudio también refleja que se genera poco empleo, dado que la mayoría de las actividades las desarrollan los propios pescadores o acuicultores sin que suponga la entrada de nuevos empleados. Sin embargo, las actividades complementarias parecen estar creciendo en el tiempo, lentamente, con algunos pescadores y acuicultores complementando sus ingresos de manera adicional.

Se ha observado una tendencia clara en relación a la acuicultura, con actividades complementarias desarrolladas por los mismo acuicultores. Estas actividades ofrecen visitas guiadas, degustaciones de productos, la promoción de restaurantes y tiendas locales. En pesca marítima, las actividades complementarias principales son visitas guiadas y excursiones de pesca.

Otros sectores

A lo largo de este trabajo, se investigaron adicionalmente cuatro (pequeños) sectores que están en relación con la pesca marítima y la acuicultura (pesca continental, pesca en hielo, marisqueo y la industria de las algas). En general mediante el análisis de estos cuatro sectores se obtiene una visión más global de la importancia económica del sector primario en la Unión Europea.

Pesca continental

La pesca comercial en aguas continentales está en declive desde la década de los años ochenta. En 2015, había entre 14.000 y 15.000 barcos de pesca operativos. Los volúmenes de capturas estimados oscilan en torno a las 35.000 toneladas (1% del total de la producción de productos pesqueros en la Unión Europea), generando un total de 100-110 millones de Euros (1-2% del total del valor de los productos desembarcados en la Unión Europea). Este sector emplea alrededor de 17.100 pescadores de aguas continentales de la UE (el equivalente a aproximadamente el 13% del total de pescadores de la Unión Europea).

La mayor parte de la pesca continental se destina a abastecer la demanda tradicional del mercado local, a veces con un marcado carácter cultural para las comunidades locales. Así, en Rumanía, Bulgaria, Italia y en el Reino Unido se registran los índices de empleo más elevados (según datos de 2011). La pesca continental en Hungría estará prohibida, mientras que en Finlandia se regula la talla mínima de desembarco de las especies capturadas.

Pesca en hielo

La pesca en hielo se desarrolla cuando el hielo cubre caladeros tradicionales en lagos y ríos. La pesca en hielo es popular principalmente en el norte de Europa, especialmente en las repúblicas bálticas, Finlandia y Suecia, de Noviembre a Marzo. La pesca en hielo es al mismo tiempo una actividad de tipo comercial y turístico/recreacional, siendo ésta última una característica de mayor importancia. Sin embargo, el peso económico de la pesca en hielo con carácter comercial así como su uso recreativo se prevé será mayor en el futuro.

La industria de las algas

Europa juega un papel discreto en la industria de las algas. Hasta el año 2000 la producción se ha mantenido estable en torno a las 350.000 toneladas. Desde entonces la producción esta en declive.

La industria de las algas en Europa consiste en la recolección (automática y manual) y en el cultivo de las algas. Francia e Irlanda están a la cabeza de la recolección automática de algas mientras que en España la recolección es manual. El cultivo de algas está aún en fase experimental en la Unión Europea, con volúmenes discretos de producción y cierta resistencia por parte de las comunidades locales.

Sin embargo, en general se ve potencial para las dos actividades tanto el cultivo como la recolección de algas, como quiera que la demanda de algas en Europa va en aumento. Si la fuerte demanda estimula la producción en Europa o bien la importación es un hecho aún por dilucidar.

El marisqueo

Diferentes especies de moluscos bivalvos, gasterópodos y crustáceos (marisco) son recolectados en el intermareal de las zonas costeras así como en ríos y lagos, de manera tanto comercial como recreativa. Esta actividad tiene lugar sobretodo en España, Portugal, Francia, Holanda, Dinamarca y en el Reino Unido. Las

principales especies fruto del marisqueo son la oreja de mar, almejas, berberechos, cangrejo de río, cangrejos, langosta, mejillones, ostras y vieiras. En España, este sector emplea a miles de mariscadores trabajando a pie por la costa. En otros países los mariscadores generan mucho menos empleo.

En Holanda y en la región de Andalucía en España, los mariscadores son principalmente varones. En Galicia sin embargo, las mujeres suponen el 90 % del colectivo, a veces esposas de pescadores, que mariscan a pie mientras los hombres mariscan desde pequeñas embarcaciones.

En general, el marisqueo es un sector importante para las comunidades locales, aunque su importancia económica es limitada tanto en términos de empleo como de los ingresos generados.

Otros países de la OCDE

Con el objeto de situar en perspectiva los resultados obtenidos aplicables en la Unión Europea, se realizó una comparación con otros seis países de la OCDE (Canadá, Islandia, Japón, Nueva Zelanda, Noruega y Estados Unidos). Los resultados obtenidos están en línea con el trabajo de gabinete efectuado para la Unión Europea; el empleo de las actividades auxiliares y los multiplicadores de ingresos se sitúan tanto para la pesca marítima como para la acuicultura en torno al 0,5 y el 1,0 (es decir, un pescador o acuicultor activo en el sector primario se estima genera entre 0,5 y 1,0 FTE en el sector de las actividades auxiliares). Aunque este resultado es ligeramente superior al encontrado en los casos de estudio, está en línea con los obtenidos en el trabajo de gabinete efectuado para la Unión Europea. La diferencia hay que achacarla al uso de diferentes metodologías en la recopilación de multiplicadores. Es el caso de haber considerado las actividades en sentido descendente mas allá de la primera venta (por ejemplo, comercio al por menor, procesamiento etc.), mientras que en este estudio solo se incluyen las actividades realizadas hasta la primera venta.

Los multiplicadores en la acuicultura parecen ser mayores que los encontrados en pesca marítima, aunque de forma marginal. Este resultado esta alineado con los obtenidos en los casos de estudio en la Unión Europea. En cuanto a la dependencia y resiliencia de las actividades indirectas respecto al sector primario, los resultados obtenidos parecen estar también alineados con los de los casos de estudio realizados en la Unión Europea. En algunos casos, la dependencia de las comunidades locales sobre la industria primaria puede ser bastante significativa, pero esa dependencia es menor cuando se trata de servicios que pueden ser fácilmente previstos por otros sectores, regiones u otros países.

Utilidad de los resultados obtenidos y recomendaciones

El presente trabajo permite reflexionar sobre la importancia económica del *sector de las actividades auxiliares a la pesca marítima y la acuicultura*. Proporciona estimaciones del empleo e ingresos generados tanto por el sector como por sus subsectores y segmentos en la UE, a nivel de estado miembro y a nivel regional. En general, las cifras cuantitativas podrán utilizarse para mejorar la efectividad de las evaluaciones de los subsidios otorgados a los operadores de pesca marítima y acuicultura a partir del Fondo Europeo Marítimo y Pesquero.

En relación con los otros cuatro sectores (más pequeños, como son la pesca en hielo, la pesca continental, la industria de las algas y el marisqueo), este estudio proporciona nuevas ideas de la importancia económica del *sector* primario. Aunque no abunda la información cuantitativa ni cualitativa para estos sectores, el trabajo proporciona sólidas estimaciones. Se identifica el potencial de la industria de la algas para cubrir la creciente demanda en la UE de este producto.

Finalmente, este trabajo también aporta sobre la importancia económica de las actividades complementarias de la pesca marítima y de la acuicultura, realizadas por (ex)pescadores y (ex)acuicultores. Se constata la dificultad de obtener datos en esta industria, ya que la información obra sobre todo en las estadísticas de turismo con poco o ningún vínculo con la pesca marítima ni la acuicultura. Sin embargo, de la información recopilada parece ser un sector en expansión. Cada vez mas pescadores ven el potencial de la pesca-turismo como un complemento adicional a su actividad. Igualmente ocurre en la acuicultura, con los operadores de las instalaciones cada vez mas y mas comprometidos en actividades de promoción y de turismo aunque a menor escala. En general, estas actividades todavía no representan unos ingresos adicionales considerables, tampoco un incremento sustancial del empleo, pues en la mayoría de las casos las llevan a cabo los mismos pescadores y acuicultores. Por ello, aunque la industria tiene potencial, su importancia económica se mantiene limitada.

En general, las actividades indirectas -a la pesca marítima y a la acuicultura- dependen todavía en gran medida del sector primario. Por tanto, se recomienda que las autoridades reguladoras incluyan siempre estas actividades en los procesos de toma de decisión al respecto del sector primario. De este modo, se habrán tenido en cuenta las consecuencias de las decisiones en la cadena comercial de suministros. Igualmente, también se recomienda que la recopilación de la información en los sectores de las actividades auxiliares siga un patrón estructurado. En general, la recopilación de datos en el sector de las actividades auxiliares esta todavía limitada cuando sin embargo puede aportar un inestimable valor añadido a la toma de decisiones. Por tanto, la recopilación de datos llevada a cabo por las autoridades a nivel local o regional debería dotarse adecuadamente para facilitar el proceso de toma de decisiones sobre la colecta de datos para ambos sectores el primario y el de las actividades auxiliares.

Añadido a lo arriba expuesto, este trabajo aporta otra serie de recomendaciones:

- El sector complementario a la pesca marítima y a la acuicultura muestra un potencial significativo. Algunas iniciativas locales, especialmente relacionadas con el turismo, han mejorado las condiciones de las comunidades locales. Algunas de ellas han gozado de fondos FEP del periodo 2007-2013 pero la CE puede ampliar las posibilidades de financiación a partir del FEMP en el periodo vigente de 2014-2020 y considerar estas acciones susceptibles de apoyo financiero en futuros instrumentos. Las actividades complementarias crean trabajo y mejoran las oportunidades laborales de las mujeres, especialmente activas en esta industria. Al mismo tiempo, las actividades complementarias pueden también proporcionar más ingresos y empleo a otros sectores (turismo). Un ejemplo se encuentra en la pesca en hielo. Aunque se trata aún de una actividad emergente a pequeña escala en términos de ingresos y empleo se constituye en un atractivo en ciertas áreas. El mismo razonamiento es aplicable por ejemplo en zonas de Francia, donde la gastronomía local en los puertos atrae a muchos turistas de ciertas regiones.
- El cultivo de algas tiene también un notable potencial. Todavía se encuentra en fase experimental pero la demanda de las algas sigue creciendo. Un apoyo más explícito por parte de la CE sería más que bienvenido, por ejemplo a partir de los fondos FEMP, los cuales pueden hacer que la industria madure más rápidamente, proporcionando más ingresos y empleo.
- El desarrollo tecnológico y la innovación tienen aún un papel importante en la industria pesquera, siempre intentando incrementar la eficacia y la eficiencia del sector primario. Esto se constituye nuevamente en una oportunidad para el sector de las actividades auxiliares, el cual provee la mayoría de los equipamientos necesarios a los pescadores y acuicultores. La CE tiene la oportunidad de apoyar en mayor medida el desarrollo tecnológico e innovación por medio de los fondos FEMP. Finalmente, se crearán oportunidades para las empresas del sector de las actividades indirectas que repercutirán igualmente en el sector primario de manera significativa.
- Más aún, la CE puede también estimular el desarrollo de iniciativas relativas a la educación. Como quiera que la industria pesquera -el sector primario y el sector de las actividades auxiliares-demanda cada vez más apoyo tecnológico, se necesitan niveles educativos más elevados en las empresas de la industria. Sin embargo, la oferta educativa ligada a la pesca y la acuicultura está muy limitada. Se requieren fuertes inversiones en este tipo de iniciativas, lo cual también resultará atractivo a los jóvenes, asunto vital para rejuvenecer al personal de la industria.

Riepilogo esecutivo

Introduzione e metodologia dello studio

Il presente studio si propone di analizzare e raccogliere dati economici e sociali per assistere DG MARE nella valutazione dell'impatto di futuri orientamenti politici e per fornire informazioni ai governanti sul potenziale impatto economico e sociale delle diverse opzioni politiche, nonché il rapporto costo-efficienza delle stesse.

Nell'Unione europea, sia la pesca marittima sia l'acquacoltura sono settori fortemente regolati. Di conseguenza, viene raccolta una considerevole quantità di dati sul settore primario, per esempio, le specie catturate o prodotte, l'occupazione, il reddito generato e altri indicatori specifici per il settore. Tuttavia, si conosce molto meno sulle attività accessorie alla pesca marittima e all'acquacoltura, compreso il relativo contributo alle economie locali e nazionali. Pertanto, il presente studio si è proposto di analizzare l'importanza economica di tali attività, prendendo in considerazione sia le attività a monte sia quelle a valle fino al primo punto di vendita.

Inoltre, lo studio identifica le tendenze più importanti in questo settore e le inserisce nel contesto dei settori primari della pesca marittima e dell'acquacoltura. Per ottenere una migliore comprensione dei dati sottostanti, sono stati altresì presi in considerazione diversi segmenti [13] e sottosettori della pesca marittima e dell'acquacoltura, assieme a dati e tendenze chiave nel settore complementare alla pesca marittima e all'acquacoltura al fine di valutare anche l'importanza economica di tale settore. Infine, il presente studio si è anche proposto di cercare l'importanza economica di altri settori strettamente correlati alla pesca marittima e all'acquacoltura, ovvero la raccolta dei frutti di mare, la pesca nelle acque interne, la pesca sul ghiaccio e il settore delle alghe.

Sebbene la ricerca sulla pesca marittima e l'acquacoltura si sia concentrata sull'importanza economica dei relativi settori accessori e complementari, data la dimensione di tali settori, il lavoro sugli altri settori si è concentrato sull'importanza economica del settore primario.

Per realizzare gli obiettivi del presente studio, sono stati utilizzati diversi metodi. In primo luogo, è stata svolta una ricerca a tavolino per raccogliere tutti i dati disponibili pubblicati nella letteratura, in database (commerciali) e in altre fonti pertinenti in tutti i 28 Stati membri dell'Unione europea. La ricerca a tavolino ha preso in considerazione tutte le lingue ufficiali dell'Unione europea. In secondo luogo, è stato inviato un questionario alle organizzazioni pertinenti al fine di raccogliere dati regionali e nazionali. Ciò ha garantito che fossero raccolti anche i dati non disponibili pubblicamente (per esempio, nella letteratura grigia). In terzo luogo, sono stati svolti 73 casi di studio al fine di ottenere dati quantitativi sull'occupazione, il reddito e i tassi di profitto, nonché altri dati qualitativi correlati ad altre caratteristiche socio-economiche (per esempio, distribuzione maschi-femmine, manodopera retribuita/non retribuita, livelli di età, livelli di istruzione, qualifiche professionali ed esperienza lavorativa) e le tendenze.

I dati raccolti sul settore accessorio alla pesca marittima e all'acquacoltura sono stati estrapolati per stimare l'importanza economica di tale settore a diversi livelli: nell'Unione europea nel complesso, nei singoli Stati membri e a livello regionale. Inoltre, per quanto possibile, sono state redatte delle stime per ciascun segmento e sottosettore identificato per il 2009 e il 2014 al fine di acquisire l'evoluzione di tali settori nel tempo.

Infine, i risultati UE sono stati disposti in prospettiva svolgendo una ricerca a tavolino su sei Paesi dell'OCSE al di fuori dell'Unione europea.

Ambito dello studio e definizioni utilizzate

Poiché molte attività e settori sono direttamente o indirettamente collegati al settore primario della pesca, è importante definire con chiarezza il settore accessorio. Nel presente studio, sono state prese in considerazione, e pertanto considerate attività accessorie, tutte le attività *fino al primo punto di vendita* che sono direttamente collegate al settore primario. Le attività esemplificative sono quelle correlate alla riparazione di apparecchiature e/o navi, attività correlate alla vendita del pesce, le forniture per le operazioni e i servizi

[13] Per la pesca marittima, sono stati definiti tre segmenti: pesca su piccola scala, pesca industriale e pesca d'altura. Per l'acquacoltura sono stati definiti quattro segmenti: itticoltura marittima, troticoltura in acqua dolce, altre acquicolture in acqua dolce e acquacoltura di bivalvi.

correlati a ricerca, sviluppo e innovazione. L'industria di trasformazione non è inclusa nell'ambito del presente studio.

Dando uno sguardo alle attività complementari, le attività prese in considerazione sono quelle intraprese dai pescatori marittimi o dai piscicoltori in aggiunta alla loro attività principale nonché le attività che hanno sostituito la loro attività principale e che non hanno alcun legame con la pesca marittima commerciale o l'acquacoltura (per esempio, turismo di pesca, guardiani del mare, servizi educativi, eccetera).

Ciò che è degno di nota è che i servizi accessori che le aziende forniscono a se stesse non sono stati presi in considerazione nella misurazione dell'importanza economica del settore accessorio. In altre parole, non sono stati inclusi i dati delle attività di mantenimento delle apparecchiature e navi, di smistamento del pesce e di gestione, nei casi in cui un'azienda, oltre alle proprie attività nel settore primario, si occupi anche di tali attività. Inoltre, la raccolta dei dati è stata concentrata su regioni o porti specifici all'interno dell'UE e pertanto i fornitori accessori situati al di fuori dell'UE non rientrano nell'ambito del presente studio.

Il settore accessorio alla pesca marittima

Nella pesca marittima, il settore primario ha impiegato circa 123.000 FTE e ha generato un reddito di circa EUR 6,8 miliardi nel 2009 e circa 109.000 FTE hanno generato un reddito di circa EUR 7,0 miliardi nel 2014. Le cifre corrispondenti del settore accessorio alla pesca marittima, prendendo in considerazione le attività rientranti nell'ambito del presente studio, sono state di 35.000 FTE e di EUR 2,8 miliardi di reddito nel 2009 e di 36.000 FTE con un reddito di EUR 2,5 miliardi nel 2014. In altre parole, il settore accessorio è circa un terzo della dimensione del settore primario in termini sia di occupazione sia di reddito generato.

La maggior parte dell'occupazione e del reddito generati nel settore accessorio si riferisce alla riparazione di apparecchiature e/o navi. Questo giustifica il circa 57% (53%) di occupazione (~19.500 FTE) e il 41% (44%) di reddito (~EUR 1,1 miliardi) nel 2009 (2014). Altre grandi fonti di reddito e di occupazione sono le attività correlate alla vendita del pesce (circa il 20% (24%) in termini di occupazione e il 23% (25%) in termini di reddito nel 2009 (2014)) e alle forniture per le operazioni (circa il 17% (16%) di occupazione e il 34% (28%) di reddito nel 2009 (2014)). I servizi relativi a ricerca, sviluppo e innovazione sono chiaramente il sottosettore meno rappresentato nella pesca marittima, totalizzando circa il 7% (6%) di occupazione e solamente circa il 3% (3%) di reddito nel 2009 (2014).

Guardando i singoli Stati membri, Spagna, Italia e Grecia sembrano essere quelli in cui il settore accessorio è più ampio in termini di occupazione (circa il 65% dell'occupazione totale stimata nel settore accessorio). Spagna e Italia rappresentano il 45% del reddito totale stimato nel settore accessorio[14]. Questi Stati membri sono subito seguiti da Francia e Regno Unito.

Nella pesca marittima sono stati identificati tre diversi segmenti, ognuno con le proprie caratteristiche: i) pesca su piccola scala, ii) pesca industriale e iii) pesca d'altura. L'occupazione accessoria relativa alla pesca su piccola scala è stata stimata essere attorno ai 15.000 FTE sia nel 2009 sia nel 2014, mentre il reddito è stato stimato a EUR 206 milioni nel 2009 e a EUR 303 milioni nel 2014. La stima dell'occupazione accessoria relativa alla pesca industriale per entrambi gli anni è di 18.500 FTE, con un reddito generato di circa EUR 2,4 miliardi nel 2009 e di EUR 2,0 miliardi nel 2014. Per la pesca d'altura, l'occupazione accessoria è stata stimata a 2.000 FTE nel 2009 e a 1.487 FTE nel 2014, generando EUR 206 milioni ed EUR 251 milioni rispettivamente. Chiaramente, la pesca d'altura è il segmento di dimensioni più ridotte nell'Unione europea, mentre il segmento industriale sembra impiegare un numero leggermente superiore di FTE se confrontato alla pesca su piccola scala.

I numeri relativi all'occupazione nel settore accessorio sono stati essenzialmente stabili tra il 2009 e il 2014, nonostante l'occupazione nel settore primario sia diminuita significativamente in tale periodo. Questo dimostra chiaramente che l'occupazione nel settore accessorio è stata piuttosto resiliente relativamente al settore primario, vale a dire che il settore accessorio non sembra essere influenzato da una diminuzione nel settore primario. Ciò non vale per il reddito nel settore accessorio, dove la principale spiegazione alla diminuzione del reddito da circa EUR 2,8 miliardi nel 2009 a circa EUR 2,5 miliardi nel 2014 appare risiedere in una combinazione di ridotte opportunità di pesca e di aumentati costi di gestione (principalmente dovuti all'aumento dei prezzi del carburante tra il 2009 e il 2014). Inoltre, la crisi economica che ha colpito l'UE nel complesso ha diminuito l'accesso ai finanziamenti e rallentato gli investimenti.

[14] Nessun dato sul reddito primario si è reso disponibile per la Grecia, pertanto non è stato possibile fare alcuna stima sul reddito accessorio.

Complessivamente, ciò ha posto pressione sul reddito delle aziende ausiliarie senza che ciò comportasse finora una diminuzione nel livello di occupazione. Questo è stato rappresentato in gran parte da due tendenze principali nel settore accessorio. Da una parte, le aziende ausiliarie stanno tentando di ridurre la propria dipendenza dalla pesca marittima locale fornendo servizi in altre regioni all'interno dello stesso Stato membro, ad altri Stati membri e al resto del mondo, e dall'altra parte, esse stanno fornendo servizi ad altri settori, quali l'agricoltura e altri settori a terra e offshore (per esempio, petrolio e gas). Nel complesso, le aziende ausiliarie sono tuttavia ancora influenzate dal settore di pesca primario, anche se in misura ridotta.

Un'altra tendenza nel settore accessorio riguarda l'innovazione, la quale ha rivestito un'importanza sempre maggiore per il settore primario; i nuovi requisiti legali e la necessità di efficienza hanno aumentato la richiesta di apparecchiature tecniche e navi nuove, più sicure e più efficienti. Questo ha avuto anche un chiaro impatto sulle aziende ausiliarie, con crescenti investimenti nelle nuove tecnologie per soddisfare questa richiesta in evoluzione. Ciò ha avuto altresì un impatto sul livello di istruzione dei dipendenti che rivestono le posizioni di ambito maggiormente tecnico nel settore accessorio.

Dando uno sguardo ad altre caratteristiche socio-economiche, la distribuzione di genere è sbilanciata verso il sesso maschile, riflettendo l'equilibrio che attualmente si riscontra in linea generale nelle tipologie della maggior parte dei profili professionali tecnici nel settore accessorio. I posti di lavoro sembrano per lo più coinvolgere la manodopera retribuita. Le uniche eccezioni sono state riscontrate nelle aziende che forniscono servizi accessori esclusivamente alle flotte di pesca locali su piccola scala. Si tratta di attività a gestione familiare con coinvolgimento attivo di membri della famiglia non retribuiti. Sebbene l'uso di manodopera straniera sia abbastanza significativo nel settore primario, ciò sembra essere un fattore di minore importanza nel settore accessorio. La maggior parte dei dipendenti sono persone locali con anni di esperienza lavorativa nel settore accessorio.

Sia il settore primario sia quello accessorio sembrano affrontare difficoltà con l'invecchiamento della forza lavoro. Il settore della pesca, sia primario sia accessorio, sembra avere poca attrattiva verso i più giovani. Il lavoro è impegnativo dal punto di vista fisico e le prospettive per il settore nel complesso sono incerte (per esempio, la diminuzione delle opportunità di pesca e l'incertezza economica in generale). I giovani preferiscono cercare lavoro in settori che offrono un'occupazione "più sicura". Tuttavia ciò potrebbe cambiare. Sono stati stabiliti programmi didattici professionali e il settore in generale sta diventando sempre più dipendente dalla tecnologia. Pertanto, i livelli di istruzione nel settore stanno aumentando poiché sono necessarie conoscenze più approfondite della (nuova) tecnologia.

Il settore accessorio all'acquacoltura

Nel 2009 e nel 2014, il settore accessorio all'acquacoltura ha impiegato circa 19.000 e 24.500 FTE rispettivamente, generando EUR 2,8 miliardi nel 2014[15]. Il segmento più ampio in termini di occupazione è stato "l'altra" acquacoltura d'acqua dolce (vale a dire tutte le acquicolture d'acqua dolce eccetto la troticoltura). Ciò ha fornito più della metà di tutta l'occupazione accessoria nel 2014.

Guardando la suddivisione dell'occupazione nei diversi sottosettori identificati nell'acquacoltura, tre sottosettori hanno fornito ciascuno circa il 30% dell'occupazione accessoria, nello specifico attività correlate alla riparazione di apparecchiature e/o navi, forniture per le operazioni e attività correlate alla vendita del pesce. Tradizionalmente, il mangime è una delle attività accessorie più importanti nell'acquacoltura. Questo è il motivo per cui le attività correlate alle forniture per le operazioni sono così importanti, anche in termini di reddito, dove circa metà del reddito totale generato è correlato a tale segmento.

In riferimento alle attività correlate alla riparazione di apparecchiature e/o navi, l'occupazione sembra essere più che raddoppiata nel 2014 rispetto al 2009. La spiegazione sembra essere che sempre più aziende impegnate nell'acquacoltura vogliono apparecchiature specializzate e ad alto livello tecnico, comportando un aumento dell'occupazione in questo sottosettore.

Dando uno sguardo ai singoli Stati Membri, è chiaro che Regno Unito, Italia e Spagna siano quelli con i più elevati livelli di occupazione e di reddito nel settore accessorio all'acquacoltura, mentre in termini di reddito, anche la Grecia è un importante Stato membro. Il rapporto part-time complessivo in questo settore è stimato essere tra 0,1-0,2, a indicare che è presente molta più occupazione a tempo pieno nel settore accessorio rispetto al settore primario dell'acquacoltura, dove il rapporto part-time è di circa 0,5. Il lavoro nel settore

[15] Sfortunatamente, si sono resi disponibili troppo pochi dati per fare una stima affidabile per il 2009.

accessorio è molto meno stagionale ed è pertanto più semplice pianificare e mantenere un numero stabile di dipendenti. Poiché molte aziende ausiliarie hanno diversificato le proprie attività in molti altri settori, questo fornisce altresì una base più solida per opportunità di lavoro a tempo pieno.

La distribuzione di genere nel settore accessorio, sembra avere una pari distribuzione di dipendenti di sesso maschile e femminile nelle attività correlate ai servizi di ricerca, sviluppo e innovazione e nelle attività di pre-vendita, mentre per le attività correlate alla riparazione di apparecchiature e/o navi e le attività correlate alle forniture per le operazioni, i lavori sono principalmente svolti dagli uomini. Ciò può essere ampiamente spiegato dalla natura del lavoro. La riparazione di apparecchiature e/o navi e le attività correlate alle forniture per le operazioni richiedono una maggiore forza fisica e pertanto vengono tradizionalmente svolte dagli uomini. La maggior parte dei servizi accessori viene fornita a livello locale e, pertanto, la maggioranza della forza lavoro nei servizi accessori è composta da persone locali.

Considerando la redditività del presente settore, la maggior parte dei servizi sembra redditizia. Tuttavia, la misura della redditività dipende dalla tipologia di servizio. La produzione e la fornitura di mangimi (dove c'è una maggiore concorrenza) e la fornitura di carburante (un bene di consumo) presentano bassi livelli di redditività al 2-4%. Tassi di redditività molto più elevati si osservano nella fornitura di apparecchiature tecniche, dove le aziende mostrano tassi del 10-30%.

Storicamente, la maggior parte dei dipendenti nel settore primario e accessorio presentano bassi livelli di successo scolastico. Poiché il processo di produzione nell'ambito dell'acquacoltura diventa sempre più sofisticato a livello tecnologico, con la maggiore necessità tecnologica al fine sia di rispettare i più stringenti requisiti legali (ambientali) sia di soddisfare il desiderio di produrre in modo più efficiente, è richiesto un maggiore know-how tecnico nel settore accessorio. Questo ha già comportato un aumento dei livelli di istruzione negli ultimi anni. La maggior parte dei lavori in questo settore fornisce un buon punto di inizio per le persone più giovani senza o con limitata esperienza lavorativa. Sebbene la maggior parte dei servizi siano altamente specializzati, fino a poco tempo fa, nessun programma didattico puntava al settore primario e accessorio dell'acquacoltura e pertanto l'apprendimento e l'esperienza lavorativa potevano essere esclusivamente accumulati sul posto di lavoro.

Esistono una serie di importanti tendenze in questo settore accessorio. In primo luogo, è presente una maggiore specializzazione nei servizi che richiedono un know-how tecnico, quali le attività correlate alla riparazione delle apparecchiature per l'acquacoltura e alle installazioni. Sono principalmente le aziende più grandi, spesso operanti su scala europea o globale, che forniscono questi servizi specializzati. Esse possono permettersi di effettuare investimenti continui e di innovarsi. Tali aziende hanno diversificato il numero di regioni in cui prestano servizio. In secondo luogo, esiste una tendenza all'ingrandimento per i fornitori ausiliari di mangimi. Le economie di scala guidano la crescita e tali aziende operano altresì su scala europea o addirittura globale. In terzo luogo, le aziende che eseguono servizi accessori forniti a livello locale, quali le attività di pre-vendita, e la manutenzione e la riparazione, stanno tendendo a diversificare le proprie attività in altri settori. Questo per diminuire la loro dipendenza complessiva dal settore dell'acquacoltura, dove molte aziende ausiliarie ora sembrano servire altri settori quali l'agricoltura, il settore edile o persino il turismo. L'effetto finale di questa diversificazione nelle altre regioni e negli altri settori rende il settore accessorio più resiliente in riferimento alle scosse nel settore primario dell'acquacoltura.

Attività complementari

Le attività complementari sono quelle svolte da (ex) pescatori o (ex) piscicoltori in aggiunta alla propria attività principale e le attività di coloro che hanno sostituito la propria attività principale e che non hanno alcun legame commerciale alla pesca marittima o all'acquacoltura in questi termini. Molti progetti hanno ricevuto sostegno dal Fondo europeo per la pesca (FEP) per diversificarsi al di fuori del settore. Sono stati identificati trenta progetti finanziati dal FEP che hanno generato almeno 64 posti di lavoro[16]. In realtà, si ritiene esistano molti più progetti, poiché non tutti sono stati comunicati così ampiamente come i progetti inclusi nel presente studio. Perciò, l'impatto dei progetti finanziati ai sensi del FEP può ritenersi essere maggiore di quanto queste cifre suggeriscano.

Nel complesso, ciò nonostante, il settore complementare alla pesca marittima e all'acquacoltura ha un significato economico solo limitato relativamente al settore primario e al settore accessorio. Infatti, le attività

[16] Tuttavia, non tutti i progetti forniscono rapporti sui posti di lavoro generati.

spesso non sono organizzate in modo professionale. Esse sembrano generare una certa quantità di reddito, tuttavia ancora marginale, sia per l'acquacoltura sia per la pesca marittima. Anche l'occupazione è limitata, dato che la maggior parte delle attività sono svolte dagli stessi pescatori o piscicoltori senza l'assunzione di ulteriori dipendenti. Tuttavia, queste attività sembrano crescere lentamente nel tempo, e alcuni piscicoltori e pescatori ritengono che le attività complementari siano una fonte benvenuta di reddito (aggiuntivo).

Considerando nello specifico l'acquacoltura, esiste la tendenza che le attività complementari siano principalmente avviate dalle stesse aziende di acquacoltura. Queste attività complementari coinvolgono principalmente la prova del prodotto, attraverso tour guidati, assaggi, ristoranti e negozi locali. Nella pesca marittima, la maggior parte delle attività complementari coinvolgono tour guidati e battute di pesca.

Altri settori

Nel corso del presente studio, sono stati cercati quattro altri settori (più piccoli) che hanno uno stretto legame con la pesca marittima e l'acquacoltura (vale a dire, la pesca nelle acque interne, la pesca sul ghiaccio, la raccolta dei frutti di mare e il settore delle alghe). Nel complesso, ciò fornisce una migliore panoramica sull'importanza economica del settore primario di questi settori per l'Unione europea.

Pesca nelle acque interne

La pesca commerciale nelle acque interne ha cominciato il proprio declino a partire dal 1980. Nel 2015, ci sono state tra le 14.000 e le 15.000 navi operanti nella pesca commerciale nelle acque interne. I volumi di cattura totali sono stimati a 35.000 tonnellate (1% della produzione totale dei prodotti della pesca dell'UE), generando EUR 100-110 milioni (1-2% del valore totale degli sbarchi UE). Questo settore impiega circa 17.100 pescatori commerciali nelle acque interne operanti all'interno dell'UE (l'equivalente di circa il 13% del numero totale di pescatori nell'Unione europea).

La maggior parte dei prodotti della pesca nelle acque interne sembra rifornire la tradizionale richiesta locale e mercati di nicchia, e spesso presenta un valore culturale per le comunità locali. Romania, Bulgaria, Italia e Regno Unito sembrano presentare i livelli più alti di occupazione in questo settore (in base ai dati del 2011). I requisiti legali possono avere un impatto particolarmente significativo sulla capacità di attrazione del settore. L'Ungheria sta vietando la pesca nelle acque interne, mentre la Finlandia sta regolando la lunghezza minima del pesce pescato.

Pesca sul ghiaccio

La pesca sul ghiaccio è un'attività popolare quando il ghiaccio ricopre le normali zone di pesca di grandi laghi e fiumi. La pesca sul ghiaccio viene principalmente praticata da novembre a marzo nel Nord Europa e, nello specifico, nei Paesi Baltici, in Finlandia e in Svezia. La pesca sul ghiaccio è un'attività sia commerciale sia turistica/ricreativa, importante soprattutto per quest'ultima; è stata rilevata infatti un'attività di pesca sul ghiaccio commerciale poco significativa. Tuttavia, l'importanza della pesca sul ghiaccio come attività ricreativa è destinata ad aumentare in futuro.

Il settore delle alghe

L'Europa è solamente un piccolo attore nel settore delle alghe. La produzione è rimasta stabile oltre le 350.000 tonnellate fino al 2000 e da allora è in declino.

Il settore europeo delle alghe è composto dalla raccolta (meccanica o manuale) delle alghe e dall'acquacoltura delle alghe. Francia e Irlanda dominano la raccolta meccanica di alghe a livello europeo. In Spagna, invece, la raccolta delle alghe avviene manualmente. L'acquacoltura delle alghe è a una fase sperimentale nell'Unione europea, con bassi volumi e resistenza da parte delle comunità (locali).

Nel complesso, tuttavia, esiste un potenziale di crescita sia per la raccolta selvaggia sia per l'acquacoltura, in quanto è presente una scarsa fornitura di alghe in Europa. Se questa domanda crescente di fatto stimolerà o meno la produzione o le importazioni europee rimane ancora poco chiaro.

Raccolta dei frutti di mare

I frutti di mare vengono raccolti nelle zone intertidali (zone costiere), e nei fiumi o laghi sia per finalità commerciali sia ricreative. Questa attività viene principalmente praticata in Spagna, Portogallo, Francia, Paesi Bassi, Danimarca e Regno Unito. Le principali specie raccolte sono abaloni, vongole, fasolari, granchi, gamberi,

aragoste, cozze, ostriche e capesante. Considerando la Spagna nello specifico, il settore è stimato impiegare qualche migliaio di raccoglitori di frutti di mare che lavorano a piedi. Negli altri Paesi, la raccolta dei frutti di mare genera un'occupazione molto inferiore.

Nei Paesi Bassi e nella regione spagnola dell'Andalusia, i raccoglitori sono principalmente uomini. Nella regione spagnola della Galizia, più del 90% sono donne, spesso mogli di pescatori, che raccolgono a piedi, mentre i raccoglitori uomini di frutti di mare lavorano da piccole imbarcazioni.

Nel complesso, la raccolta dei frutti di mare è importante per specifiche comunità locali, tuttavia l'importanza economica del settore è limitata, sia in termini di reddito sia in termini di occupazione generata.

Altri Paesi dell'OCSE

Per mettere in prospettiva i risultati sul settore accessorio nell'Unione europea, è stato altresì fatto un confronto con sei Paesi dell'OCSE (Canada, Islanda, Giappone, Nuova Zelanda, Norvegia e Stati Uniti). I risultati sono stati in linea con quelli provenienti dalla ricerca a tavolino condotta nell'Unione europea; l'occupazione accessoria e i moltiplicatori di reddito sembrano essere compresi tra 0,5 e 1,0 sia nella pesca marittima sia nell'acquacoltura (vale a dire, un pescatore o piscicoltore attivo nel settore primario è stimato generare tra 0,5 e 1,0 FTE nei settori accessori alla pesca marina e all'acquacoltura). Sebbene questi siano leggermente superiori rispetto ai moltiplicatori osservati nei casi di studio, sono simili ai risultati della ricerca a tavolino condotta sull'Unione europea. La differenza sembra risiedere principalmente nei risultati delle differenze nel metodo e nella definizione applicata durante la raccolta dei moltiplicatori. Questo appare essere particolarmente vero per le attività a valle, dove la definizione sembra andare oltre il primo punto di vendita (per es., vendita al dettaglio, seconda trasformazione, ecc.), mentre il presente studio arriva a considerare solamente il primo punto di vendita.

I moltiplicatori nell'acquacoltura sembrano essere superiori rispetto a quelli osservati nella pesca marittima, seppur marginalmente. Anche questo dato è coerente con i risultati raccolti nell'Unione europea. In termini di dipendenza da e di resilienza complessiva del settore accessorio relativamente al settore primario, i risultati sembrano altresì essere in linea con quelli raccolti nell'Unione europea. In alcune comunità locali, la dipendenza dal settore primario può essere piuttosto significativa, tuttavia la dipendenza diminuisce nei casi in cui i servizi possono essere facilmente trasferiti ad altri settori e regioni o Paesi.

Fruibilità dei risultati dello studio e raccomandazioni

Lo studio fornisce approfondimenti sull'importanza economica del *settore accessorio alla pesca marittima e all'acquacoltura.* Fornisce stime sulla dimensione dell'occupazione e del reddito generati nel presente settore, nonché nei relativi sottosettori e segmenti, a livello regionale e dei singoli Stati membri dell'UE. Nel complesso, queste cifre quantitative possono essere impiegate per migliorare le valutazioni dell'efficacia dei sussidi del Fondo europeo per gli affari marittimi e la pesca in relazione alla pesca marittima e all'acquacoltura.

In relazione agli altri quattro settori (più piccoli) (vale a dire, pesca sul ghiaccio, pesca nelle acque interne, settore delle alghe e raccolta dei frutti di mare), questo studio fornisce approfondimenti sull'importanza economica del *settore primario*. Sebbene non siano disponibili molti dati quantitativi e qualitativi per questi settori, il presente studio fornisce alcune stime. È stato identificato il potenziale per lo sviluppo del settore delle alghe in quanto la richiesta di alghe è in aumento nell'UE.

Infine, il presente studio ha anche ricercato l'importanza economica di attività complementari alla pesca marittima e all'acquacoltura intraprese da (ex) pescatori ed (ex) piscicoltori. Si è rivelato difficile raccogliere dati su questo settore, dal momento che tali dati vengono in gran parte raccolti nell'ambito di statistiche turistiche più ampie aventi poco o nessun legame con la pesca marittima e l'acquacoltura. Tuttavia, sulla base delle prove aneddotiche raccolte, questo settore complementare sembra essere in espansione. Più pescatori considerano il potenziale di viaggi turistici come un'aggiunta alle loro attività di pesca. Anche nell'acquacoltura, sempre più piscicoltori si stanno impegnando in attività di promozione del pesce o del turismo, seppur in scala ridotta. Nel complesso, queste attività non sembrano comunque generare molta occupazione o reddito aggiuntivi, in quanto in gran parte svolte come attività promozionali da parte dei pescatori o delle stesse aziende di acquacoltura. Pertanto, sebbene il settore presenti un potenziale, la relativa importanza economica è ancora limitata.

In generale, per quanto concerne l'ambito del presente studio, le attività accessorie correlate alla pesca, pesca marittima e acquacoltura, sono ancora in gran parte dipendenti dai settori primari. Pertanto, si raccomanda che i governanti includano sempre le attività accessorie nel prendere decisioni aventi un impatto sul settore primario. In questo modo, vengono presi in considerazione gli effetti totali di una decisione sulla catena di approvvigionamento completa. Nello stesso senso, sarebbe consigliabile anche raccogliere dati sui settori accessori su base maggiormente strutturale. Nel complesso, la raccolta dei dati sul settore accessorio è ancora limitata, sebbene possa così aggiungere valore significativo alla definizione delle politiche. Di conseguenza, la raccolta dei dati da parte di governi locali o regionali deve essere meglio equipaggiata al fine di facilitare il processo decisionale in base ai dati raccolti sia dal settore primario sia da quello accessorio.

In aggiunta a quanto sopra, è possibile esprimere alcune raccomandazioni più specifiche come conseguenza del presente studio:

- Il settore complementare alla pesca e all'acquacoltura mostra un potenziale significativo. Alcune iniziative locali, specialmente correlate al turismo, hanno già creato un valore significativo per le comunità locali. Alcune di queste iniziative sono state finanziate dal FEP nel periodo 2007-2013, tuttavia l'UE può rafforzare l'uso del FEAMP in riferimento a tali iniziative per il periodo 2014-2020, considerandole per strumenti finanziari a termine, se possibile. Le attività complementari creano opportunità di lavoro e di reddito per le donne, le quali sono particolarmente attive in questo settore. Al contempo, queste attività complementari forniscono altresì più reddito e occupazione in altri settori (turistici). Ne è un esempio la pesca sul ghiaccio. Sebbene si tratti di un'attività svolta ancora su piccola scala in termini di reddito e di occupazione, può essere importante per attrarre turisti in regioni specifiche. Lo stesso si applica alle attività complementari per esempio in Francia, dove la gastronomia locale nei porti attrae molti turisti in determinate regioni.
- Il settore dell'acquacoltura delle alghe presenta altresì un potenziale significativo. L'acquacoltura delle alghe è ancora alla fase sperimentale mentre la richiesta di prodotti a base di alga è in aumento. Un'ulteriore stimolo dalla CE, per esempio mediante il FEAMP, può accelerare gli sviluppi e aumentare la maturità del settore, fornendo maggiori opportunità di reddito e di occupazione.
- La tecnologia e l'innovazione rivestono già un ruolo importante nel settore della pesca, nel quale vengono sempre più usate per aumentare l'efficacia e l'efficienza delle attività primarie. Ciò è considerato come un'opportunità anche per il settore accessorio, con la fornitura di un numero superiore di queste apparecchiature ai pescatori e ai piscicoltori. La CE ha la possibilità di aumentare ulteriormente il livello tecnologico e innovativo stimolandone l'impiego attraverso, per esempio, il FEAMP. Alla fine, questo creerà opportunità per le aziende ausiliarie e produrrà un beneficio significativo per il settore primario.
- Inoltre, la CE può anche stimolare lo sviluppo di iniziative correlate all'istruzione. Poiché il settore della pesca, sia primario sia accessorio, sta diventando sempre più dipendente dalla tecnologia, le aziende attive nel settore richiedono livelli superiori di istruzione. Tuttavia, le opportunità didattiche che sono direttamente correlate alla pesca sono disponibili solamente in misura limitata. L'investimento in queste tipologie di iniziative, consentirà anche di attrarre più giovani nel settore, il che è vitale data l'età relativamente avanzata della forza lavoro nel settore primario e accessorio.

1 Introduction

This final report describes the results of tasks 1-6 (of the RfS) executed during this study and presents the results and its interpretation in a quantitative and qualitative manner, as well as using different geographical representations of the results. The draft version of the final report is submitted in Month 10 of this study (December 2015), followed by a final version of the final report (including the executive summary) in Month 12 (February 2016) and a revised version in Month 13 (March 2016).

The aim of this study is to gather more insight in employment and income generated in the ancillary service sectors linked to marine fishing and aquaculture. Furthermore, recent trends and socio-economic characteristics of the ancillary sector are investigated. A second objective of the study is to get more insight in the complementary activities undertaken by marine fishermen and aquaculture farmers. Finally, also some other sectors related to fisheries, namely inland fishing, ice fishing, seaweeds industry and shellfish gathering are taken into account to provide more insight in the importance of these sectors for Europe.

In chapter 2 the methodology used during this study is described. Chapter 3 provides the results for marine fishing, followed by chapter 4 in which the results for aquaculture are described. Chapter 5 provides an overview of the complementary sector, after which chapter 6 provides the overview of the other sectors linked to fishing. Finally, chapter 7 puts the results of this study in perspective by comparing the results of this study with six OECD countries outside Europe.

2 Methodology of the study

To collect available data on both activities ancillary and complementary to fishing and aquaculture and on the seaweeds industry, inland fishing, shellfish gathering, and ice fishing, a desk research was executed. After the desk research, field work in several Member States was conducted to gather first hand data via targeted case studies. All data gathered is used in an extrapolation model to get insights on a European level. Finally, this data is put in perspective by comparing the outcomes of this study with available data from OECD countries (see Chapter 7). The different steps and methods used during this study are described in the paragraphs below, where first the method of the desk research will be discussed, after which the methodology of the cases studies will be presented. Subsequently, the extrapolation model will be discussed. The final section in this chapter will outline the method used for the desk research with respect to other OECD countries.

2.1 Desk research

Overall, the desk research consisted of two main steps. First, an extensive web search was executed to find all available data published in literature, (commercial) databases and other relevant material available in the 28 Member States. In addition, subcontractors of the consortium were contacted to collect additional national and regional data. Second, all kinds of organisations were approached by means of a questionnaire to collect more data and more specifically, national and regional data[17].

2.1.1 Web search

In a web search, relevant data and studies are gathered by searching the Internet and databases for published material. For this web search, different strings were defined targeted at the type of data we are looking for in this study. These strings, and synonyms of these strings using the Google Search Engine, have been translated in all 24 native languages of all European Member States to search for both national and regional data. Figure 1 and Figure 2 show the different strings used during the web search.

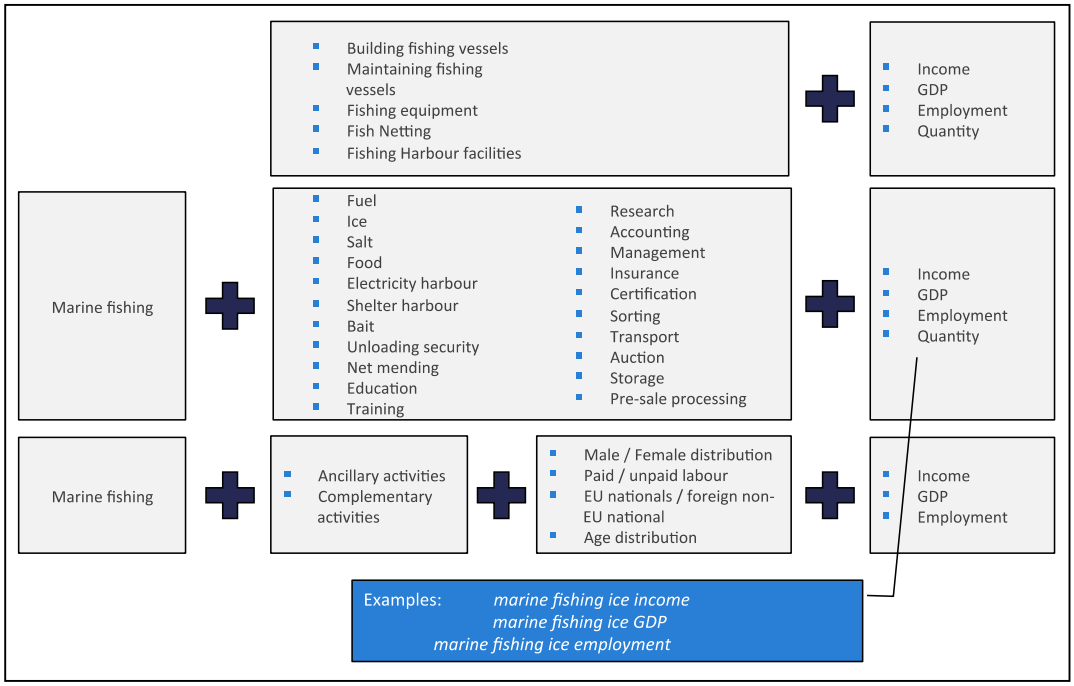


Figure 1. Used strings in desk research: Marine fishing

[17] Overall, more than 600 studies were collected of which 93 studies contained usable data related to the study area.

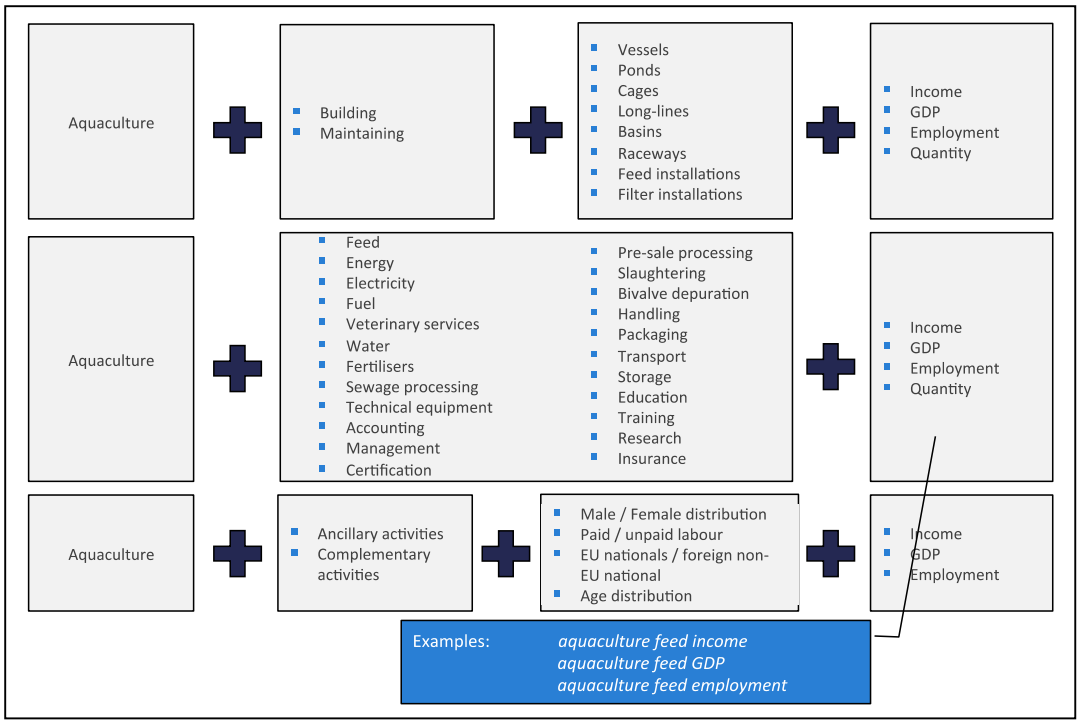


Figure 2. Used strings in desk research: Aquaculture

It should be noted that the strings (e.g. aquaculture feed employment) did not provide a lot of usable data. Most data were found by using more general key words, such as "ancillary services". When data was found, it was difficult to link this data to some general baseline of data of the sector. In the end, the baseline of data is needed to come up with multipliers[18] for regions or is used for further calculations within or between regions.

After completing this thorough web search, subcontractors were activated in eight different Member States (i.e. the United Kingdom, Spain, Italy, Greece, France, Denmark, Poland, and Hungary) to collect additional data. They were asked to search for regional and local studies based on the strings presented in Figure 1 and Figure 2, with a special focus "ancillary services" and "complementary services" as key search terms. Similar to our web search, they were most successful in collecting data by using "ancillary" as a search term.

2.1.2 Questionnaire to organisations

The web search, was complemented by requesting organisations that are active in this field for any data related to the sectors and activities within the scope of this study. The questionnaire was focused on collecting data and only contained a limited amount of questions. To increase the response rate, the questionnaire was also translated to Italian, French and Spanish. The main focus of the questionnaire was on activities ancillary and complementary to fishing and aquaculture and on any data that may indicate the economic importance of ice fishing, inland fishing, the seaweed industry and shellfish gathering. The questionnaire was sent by e-mail[19] to an extensive contact database and was accompanied by attachments to explain the supply chain of both aquaculture and marine fishing with respect to ancillary activities and a definition of complementary services. In addition, a letter of recommendation signed by DG MARE was attached to stimulate organisations to respond to our request. This letter also further emphasised the importance of this study.

The questionnaire was distributed by using an extensive contact database created by collecting all the important organisations active within the sectors in scope of this study. In the end, 762 contacts were approached to fill in the questionnaire. All responses were categorised in two types of responses: i) response received without studies and ii) response received with studies. Figure 3 and Figure 4 present the outcomes of the questionnaire by type of organisation and country.

[18] Multipliers, including its definition, are further explained in Chapter 4

[19] The first e-mail was sent on 29 April 2015 and a reminder was sent on 27 May 2015.

Type of organisation	Response received without studies	Response received with studies
National contact harvesting seaweeds	2	5
Advisory Counsel EC	3	0
Axis 4 National contacts	3	2
University / Research institute	4	7
Regional fisheries authorities	4	1
National authority	4	4
Fishing association	9	2
Regional port authority	5	1
Chamber of commerce	3	0
Regional port	10	2
Regional Axis	8	4

Figure 3. Number of responses by type of organization

Country	Response received without studies	Response received with studies	Country	Response received without studies	Response received with studies
Ireland	3	3	Greece	2	0
Austria	1	0	Latvia	2	0
Estonia	2	1	Sweden	2	0
Czech Republic	1	0	Romania	1	0
France	4	4	Italy	3	1
Germany	4	3	Netherlands	1	0
Finland	2	1	Croatia	0	0
Belgium	2	1	Cyprus	0	0
Denmark	5	3	Hungary	0	0
United Kingdom	8	5	Lithuania	0	0
Bulgaria	1	0	Luxembourg	0	0
Portugal	1	1	Malta	0	0
Spain	6	4	Slovakia	0	0
Poland	4	1	Slovenia	0	0

Figure 4. Number of responses by country

Overall, out of the 762 e-mails sent[20, 21], 84 contacts replied either with or without studies resulting in an overall response rate of 11%. Considering the method[22] used, the response rate of the questionnaire is considered acceptable. In Figure 5 the results are summarised.

[20] This is excluding the reminders. Including the reminders more than 1600 e-mails were sent.

[21] In the questionnaire, contacts were also asked for additional contacts. When additional contacts were delivered, they were also included in the desk research by sending them the questionnaire by e-mail.

General information	
Number of e-mails sent	762
Response received without studies	55
Response received with studies	28
Response rate (in %)	11%

Figure 5. Results questionnaire

2.2 Case Studies

This Chapter describes the method that is applied in conducting the field work by means of case studies during this study. First, the purpose of the case studies is described, after which the questionnaires are discussed that are used to collect both quantitative and qualitative data on the sectors in scope of this study. Thirdly, the division of case studies over the Member States as well as the different sectors is described.

2.2.1 Purpose of the case studies

Case studies are used to gather data and insights in areas around Europe. During the desk research of this study it became clear that there is quite some qualitative and quantitative data available in current literature looking at activities ancillary to marine fishing and aquaculture. However, it is difficult to compare the data found, since these are often collected using different methods, using different definitions and apply to areas with different sizes and socio-economic characteristics. Therefore, the main source of information for this study is fieldwork by means of case studies in 11 different Member States[23]. In the end, the selected Member States and areas within Member States reflect a representative view of the activities in scope of this study.

The case studies deliver quantitative data on employment, income, profit rates, and market shares, as well as more qualitative data related to socio-economic characteristics (i.e. male-female distribution, paid/unpaid labour, age levels, education levels, professional qualification and working experience) and trends. All case studies result in an output document summarising the findings of the specific case study. For marine fishing and aquaculture, data is presented at the lowest level possible – most likely port level (marine fishing) and regional level (aquaculture) – and focus primarily on the sector ancillary and complementary to marine fishing and aquaculture. In the end, the case studies provide insight in the economic importance of these sectors and describe the trends of the last 5 years[24].

For the other sectors in scope of this study (e.g. inland fishing, shellfish gathering, the seaweeds industry, and ice fishing, discussed in Chapter 7) the focus was primarily on the economic importance of the primary sector rather than the sectors ancillary and complementary to these sectors. Nevertheless, when possible, data was collected on the ancillary and complementary sector. These sectors are smaller compared to marine fishing and aquaculture and less is known and publicly available about these sectors. In the end, the case studies provided data on the economic importance of these sectors for the region.

From a qualitative point of view, it should be noted that the case studies were used to gather insight in recent trends in activities ancillary and complementary to fishing and aquaculture as well as trends in the primary sector between 2009-2014 (more years were taken into account when available). These trends served as background and explanation related to the ancillary and complementary sector and how these trends can be explained. Geographical differences were taken into account during this trend analysis.

Regarding the structure of each case study, each case study consisted of at least four interviews at ancillary service providers, fishing associations, port authorities, and producer organisations. In addition to the interviews, national and regional registers were also consulted to collect additional data. Moreover, phone calls were made directly to companies providing ancillary and complementary services and their websites and company reports were consulted to gather quantitative data. Results of these actions differed per Member

[22] The questionnaire was sent using e-mail to 30 different countries in often a foreign language using a database comprised of 'cold' contacts.

[23] Denmark, Estonia, Finland, France, Greece, Hungary, Spain, Italy, Poland, the Netherlands and the United Kingdom.

[24] Focus is from 2009 to 2014, but if data on other years was available this has been included.

State, due to the publically available data and willingness of companies to provide data. Furthermore, restrictions in time and availability of respondents should be considered.

The results of the case studies are processed in a uniform way using standardised output templates to increase comparability between case studies in the same sectors as well as in different sectors. In the end, for each case study, one case study output template summarises all the information that was collected during the specific case study.

2.2.2 Questionnaires per sector per type of organisation

The case studies were executed using pre-defined questionnaires to create a uniform way of data gathering across the different Member States and sectors. Case studies were executed by local research teams with local expertise, able to speak the native language of the specific Member State. In this way, it was made sure that relevant data was collected in the most convenient way for interviewees. Different questionnaires have been created for the two target groups of the interviews as these interviews have a (slightly) different perspective.

Also a general introduction for the interviewer was included to set the scene as an introduction of the interview. For marine fishing and aquaculture two types of questionnaires have been included: one for fishing associations, port authorities and producer organisations and one for providers of ancillary services (e.g. auctions, shipyards, gear manufacturers, suppliers, et cetera). Given the fact that the focus of the case studies in the other sectors was different, for these sectors two different types of questionnaires have been included: one for firms active within the primary sector and one for fishing associations, port authorities and producer organisations.

2.2.3 Division of case studies per segment per Member State

During this study, the contractor performed 73 case studies to gather on the ground quantitative and qualitative data. The selected Member States for case studies were: Denmark, Estonia, Finland, France, Greece, Hungary (landlocked country), Spain, Italy, Poland, the Netherlands and the United Kingdom. This selection comprises of 10 coastal Member States and 1 landlocked Member State. This selection was made to ensure that all sectors (e.g. marine fishing, aquaculture, shellfish gathering, the seaweed industry, ice fishing and inland fishing), and segments within the sectors, in scope of this study were covered and that the selection represents a good geographical spread across Europe. 3 case studies comprise of so called ‘company profiles’, to get a better insight of important companies in the sectors in scope of this study and 8 case studies were purely focused on complementary activities in certain regions, to get more insights in the relation between complementary activities in fishing areas and (former) fishermen.

Furthermore, given the fact that more data on ancillary and complementary services is available in areas where production of fish is relatively high, it was important to also take into account the geographical location of the case study. Meaning, case studies focused as much as possible on areas with relatively high production/catch rates.

Figure 6 provides an overview of the case studies in different sectors across the selected Member States, as conducted during this study.

	Marine Fishing	Aquaculture	Inland fishing	Shellfish gathering	Seaweeds industry	Ice fishing	Comple-mentary activities	Total
Denmark	2	3						5
Estonia						1		1
Finland			1			1		2
France	4	4		1	2		1	12
Greece	4	4					1	9
Hungary		1	1					2
Italy	3	3	1				1	8
The Netherlands	1	1		1			1	4
Poland	2	2						4
Spain	7	5		2	2		3	19
United Kingdom	3	3					1	7
Total	26	26	3	4	4	2	8	73

Figure 6. Number of case studies and distribution across Europe and sectors[25]

Within the selected Member States specific areas are defined to conduct the case studies. These areas have been chosen – and approved – in close collaboration with DG Mare and local subcontractors, to ensure a representative way of data gathering.

Figure 7 provides a complete overview of all case studies conducted[26] during this study.

#	Country	Sector	Segment	Case study region
1	Denmark	Aquaculture	Company profile	Bio-Mar
2	Denmark	Aquaculture	Trout freshwater aquaculture	Central Jubland
3	Denmark	Aquaculture	Marine finfish aquaculture	Sjaelland
4	Denmark	Marine fishing	Industrial port	Strandby port
5	Denmark	Marine fishing	Small-scale port	Gilleje port
6	Estonia	Ice Fishing	-	Lake Peipsi
7	Finland	Ice fishing	-	Tampere region
8	Finland	Inland fishing	-	Tampere region
9	France	Aquaculture	Bivalve aquaculture	Poitou-Charentes
10	France	Aquaculture	Bivalve aquaculture	Bretagne
11	France	Aquaculture	Trout freshwater aquaculture	Bretagne
12	France	Aquaculture	Marine finfish aquaculture	Mediterranean coast

[25] Please note that the company profiles were either focused on companies active in the aquaculture sector or the fishing sector, where each of these company profiles were added to either marine fishing or aquaculture; 2 to marine fishing and 1 to aquaculture.

[26] For aquaculture at the beginning of the project three segments were defined, where no split in freshwater aquaculture was made. The difference in way of working and consequently outcomes in multipliers required a split in the freshwater aquaculture segment into 'other freshwater aquauclture' and 'trout freshwater aquaculture'. Therefore, in this final report there are four segments defined within aquaculture.

#	Country	Sector	Segment	Case study region
13	France	Complementary activities	-	Bretagne
14	France	Marine fishing	Industrial port	Guilvinec
15	France	Marine fishing	Industrial port	Boulogne
16	France	Marine fishing	Long-distance port	Concarneau
17	France	Marine fishing	Small-scale port	Toulon
18	France	Seaweeds Industry	-	Bretagne
19	France	Seaweeds Industry	-	Bretagne
20	France	Shellfish gathering	-	Bretagne
21	Greece	Aquaculture	Bivalve aquaculture	Halastra, Thessaloniki
22	Greece	Aquaculture	Marine finfish aquaculture	Thesprotia
23	Greece	Aquaculture	Marine finfish aquaculture	Preveza
24	Greece	Aquaculture	Marine finfish aquaculture	Halkida
25	Greece	Complementary activities	-	Mahaniona
26	Greece	Marine fishing	Industrial port	Mahaniona port
27	Greece	Marine fishing	Industrial port	Kavala port
28	Greece	Marine fishing	Small-scale port	Lavrio port
29	Greece	Marine fishing	Small-scale port	Oropos port
30	Hungary	Aquaculture	Other freshwater aquaculture	Hajdu-Bihar
31	Hungary	Inland fishing	-	Lake Balaton
32	Italy	Aquaculture	Bivalve aquaculture	Puglia
33	Italy	Aquaculture	Trout freshwater aquaculture	Friuli Venezia Giulia
34	Italy	Aquaculture	Marine finfish aquaculture	Puglia
35	Italy	Complementary activities	-	Puglia
36	Italy	Inland fishing	-	Veneto
37	Italy	Marine fishing	Industrial port	Ancona port
38	Italy	Marine fishing	Industrial port	Chioggia port
39	Italy	Marine fishing	Small-scale port	Brindisi
40	Poland	Aquaculture	Other freshwater aquaculture	Barycz
41	Poland	Aquaculture	Other freshwater aquaculture	Morenka
42	Poland	Marine fishing	Industrial port	Kolobrzeg port
43	Poland	Marine fishing	Industrial port	Wladyslawowo port
44	Spain	Aquaculture	Bivalve aquaculture	Galicia
45	Spain	Aquaculture	Bivalve aquaculture	Catalonia
46	Spain	Aquaculture	Trout freshwater aquaculture	Castilla Leon
47	Spain	Aquaculture	Marine finfish aquaculture	Murcia
48	Spain	Aquaculture	Marine finfish aquaculture	Valencia
49	Spain	Complementary activities	-	Galicia
50	Spain	Complementary activities	-	Andalusia
51	Spain	Complementary activities	-	Girona coast

#	Country	Sector	Segment	Case study region
52	Spain	Seaweeds industry	-	Asturias
53	Spain	Marine fishing	Company profile	Astilleros Armon
54	Spain	Marine fishing	Industrial port	Burela port
55	Spain	Marine fishing	Industrial port	Isla Cristina port
56	Spain	Marine fishing	Industrial port	Ondarroa port
57	Spain	Marine fishing	Long-distance port	Las Palmas port
58	Spain	Marine fishing	Long-distance port	Bermeo
59	Spain	Marine fishing	Small-scale port	Noia port
60	Spain	Seaweeds industry	-	Galicia
61	Spain	Shellfish gathering	-	Galicia
62	Spain	Shellfish gathering	-	Andalucia
63	The Netherlands	Aquaculture	Bivalve aquaculture	Zeeland
64	The Netherlands	Complementary activities	-	Zeeland
65	The Netherlands	Marine fishing	Long-distance port	IJmuiden port
66	The Netherlands	Shellfish gathering	-	Friesland
67	United Kingdom	Aquaculture	Bivalve aquaculture	Isle of Mull
68	United Kingdom	Aquaculture	Trout freshwater aquaculture	Hampsire / Wiltshire
69	United Kingdom	Aquaculture	Marine finfish aquaculture	Isle of Mull
70	United Kingdom	Complementary activities	-	Cornwall
71	United Kingdom	Marine fishing	Company profile	Scottisch Fishermen Organisation
72	United Kingdom	Marine fishing	Industrial port	Fraserburgh port
73	United Kingdom	Marine fishing	Small-scale port	Weymouth port

Figure 7. Overview of all case studies conducted during this study.

2.2.4 Output and case study results

When interpreting findings of the case studies it is important to know what is included and excluded in the data presented. Moreover, the way by which data is collected in the case studies provide important context in reading and understanding the case studies. This Section explains what is measured in the case studies and how it is measured. Since case studies in marine fishing, aquaculture and the other sectors have a different focus both are discussed separately.

2.2.4.1 Marine fishing and aquaculture

Primary focus of case studies in marine fishing and aquaculture is on measuring the economic importance of sectors ancillary and complementary to marine fishing and aquaculture. Data is collected by local experts, using interviews at ancillary providers, fishing associations, port authorities, or producer organisations. When faced with gaps in the data after the interviews, local experts further contacted other organisations by phone, consulted websites and company reports, and consulted national and local registers to gather additional data[27].

Looking at what is measured in the case studies, data collection is focused on quantitative and qualitative information on activities ancillary and complementary to marine fishing and aquaculture. Quantitative data is

[27] What is worth noting is that registers often do not have data on employment and income, since in many countries, only companies with a certain size have to submit this kind of information to the registers. Furthermore, registers do not collect data on market shares and profit rates.

considered data on employment, income, profit rate and market share[28], where qualitative data is considered other socio-economic data (male-female distribution, age distribution, education level, wage level, et cetera) and trends. Data is collected on 2009 and 2014, but data on other years is included when available. To provide additional context to the case studies and put data on the ancillary and complementary sector into perspective, data on the primary sector is also collected. Collected data on the primary sector includes data on employment, income, and volumes and species caught (or produced in case of aquaculture) as well as trends.

Given the fact that activities ancillary to marine fishing and aquaculture is a broad term and that many activities and sectors are either directly or indirectly linked to the primary sector, activities included in this study are all the activities *up-to the first point of sale* and only those that are directly linked to the primary sector. To make sure that case study output is comparable between case studies an outline of included activities has been made using the supply chain of marine fishing and aquaculture (included activities are presented in Annex II). When looking at complementary activities, the activities taken into account are those that are undertaken by marine fishermen or fish farmers in addition to their core business as well as activities whom have replaced their core business and have no link to commercial marine fishing or aquaculture (e.g. pesca tourism, guardians of the sea, educational services, et cetera).

What is worth noting in measuring the economic importance of activities ancillary to marine fishing and aquaculture, is that the ancillary services that companies provide themselves have not been taken into account in the case studies[29]. For instance, when a company in addition to their activities in the primary sector also maintains their own equipment and vessels, sorts the fish and does its own management, data on these activities have not been included. Furthermore, since case studies are focused on ports and regions, data gathering was focused on data related to the region or port in scope.

Although local experts have been thorough in their attempts to collect data, in some cases they were unsuccessful, for different reasons. Quite some companies were for instance reluctant to provide (sensitive) company information (especially profit rate). Furthermore, company reports are often not available due to the limited size of companies and registers in many cases do not collect the type of data in scope of this study. In the case studies, missing information is being referred to as *not disclosed*, or *N.D.*, when companies did not want to disclose information or as *Unknown*, when no data was found.

2.2.4.2 Other sectors

The other sectors in scope of this study are shellfish gathering, ice fishing, inland fishing, and the seaweeds industry. Unlike marine fishing and aquaculture, the case studies in these sectors are focused on the economic importance of the primary sector. This does not mean that activities ancillary and complementary to this sector have not been taken into account. When information was available and found, this has been included in the case study output report.

Data on these sectors is also collected by local experts, using three interviews with at least one company active in the primary sector and one fishing association, port authority or producer organisation. When faced with gaps in the data after the interviews, local experts further contacted other organisations by phone, consulted their website and company reports, and consulted national and local registers to gather additional data[30].

The data measured in these case studies is focused on both quantitative and qualitative data, where quantitative data includes data on employment, income and profit, and qualitative data includes other socio-economic data (age distribution, education level, wage level, et cetera) and trends. Data is collected on 2009 and 2014, but data on other years is included when available. Furthermore, since case studies are focused on regions, only data related to these regions is included. In a qualitative way the connection to other regions is described when this was discovered during the case study.

Although local experts have been thorough in their attempts to collect data, in some cases they were unsuccessful, for different reasons. Quite some companies were for instance reluctant to provide (sensitive)

[28] Market share is only measured for activities ancillary to marine fishing and aquaculture.

[29] It is determined that activities which can be characterized as ancillary services within primary marine fishing companies or aquaculture firms are excluded from the case study calculations (interim report of this study, pp. 50).

[30] What is worth noting is that registers often do not have data on employment and income, since in many countries, only companies with a certain size have to submit this kind of information to the registers. Furthermore, registers do not collect data on market shares and profit rates.

company information (especially profit rate). Furthermore, company reports are often not available due to the limit size of companies and registers in many cases do not collect data in scope of this study. In the case studies, missing information is being referred to as *not disclosed*, or N.D., when companies did not want to disclose information and *unknown*, when no data was found. Especially for the other sectors in scope of this study it was hard to find publically available data, as not much data on these sectors is collected.

2.3 Extrapolation model

This section introduces the overall method used for the extrapolation. Extrapolation is used in this study to come from the data gathered in the 73 cases studies to income and employment figures in the European Union for ancillary sectors related to marine fishing and aquaculture. To do so, both data from external sources and gathered information during the case studies is used. Hereunder the extrapolation model is explained, including the main assumptions made for extrapolation.

In the first subsection of this section the concept of multipliers will be introduced, which is used in the extrapolation in order to take advantage of as much information as possible. In the second subsection the overall extrapolation method is introduced.

2.3.1 Employment, income and production multipliers

In order to use as much information as possible about the relevant sector or segment, the extrapolation is made using employment, income and production multipliers for the ancillary sector relative to the primary sector. Thus using information about the activity in the ancillary sector relative to the activity in the primary sector from the case studies, the activity in the ancillary sector in the ports/regions not included in the case studies can be modelled based on the activity in the primary sector in these ports/regions.

The choice of using multipliers in the extrapolation is based on an assumption, that the activity in the ancillary sector is correlated with the activity in the primary sector[31]. Thus when using, for example, an average employment multiplier of 0.5 to estimate the employment in the ancillary sector in all ports/regions of a specific segment, it is assumed that the FTE in the ancillary sector is on average half the FTE in the primary sector across all ports or regions within the same segment of marine fishing or aquaculture. This multiplier ratio of, for example, 0.5 is based on findings during the case studies in areas / ports with similar characteristics (clustered in so called segments). Using the multiplier, the employment in the ancillary sector can be estimated for Member States not visited, if data on employment in the primary sector is available; e.g. if employment in the primary sector is 100 FTE and the employment multiplier is 0.5, the employment in the ancillary sector is estimated to be 50 FTE. Since data on the primary sector is available for all EU28 Member States, it is therefore argued that multipliers are the most accurate method for calculating the activity in the ancillary sector. Using this method, the estimates are based on factors that affect the ancillary sector through changing the activity in the primary sector, based on the found multiplier for the specific segment during the case studies executed around Europe.

Based on the availability and quality of external data for countries in EU28, which is described more thoroughly later in this section for both marine fishing and aquaculture, it is chosen to use employment and income multipliers for the extrapolation of marine fishing data and production multipliers for the extrapolation of aquaculture data. Production multipliers are similar to employment and income multipliers, where in production multipliers, production is used as the baseline for calculation of the multiplier related to employment or income in a region. For instance, when 10 FTE is found in the ancillary sector of a region with a production of 100 tonnes, the production multiplier is 0,1, or per tonne produced, 0,1 FTE is created.

The relevant multipliers[32] are calculated according to the formulas presented in Figure 8, where employment is measured in FTE, income is measured in million Euros, and production is measured in tonnes.

[31] It is assumed that, within a year, the activity in the ancillary sector is correlated with the activity in the primary sector. In other words, when looking at ports in 2014, ports with a lot of employment in the primary sector, generally also have larger employment in the ancillary sector. Correlation across time is not needed, i.e. if the employment in the primary sector in a harbour is larger in 2014 than in 2009, the employment in the ancillary need not be larger in 2014 than in 2009.

[32] It is important to notice that multipliers have been calculated for each of the three segments for marine fishing and for the four segments of aquaculture. These *multipliers per segment* have been used for the extrapolation of data.

$$Employment\ multiplier = \frac{employment\ in\ ancillary\ sector}{employment\ in\ primary\ sector}$$

$$Income\ multiplier = \frac{income\ in\ ancillary\ sector}{income\ in\ primary\ sector}$$

$$Production\ multiplier\ for\ employment = \frac{employment\ in\ ancillary\ sector}{production\ in\ primary\ sector}$$

$$Production\ multiplier\ for\ income = \frac{income\ in\ ancillary\ sector}{production\ in\ primary\ sector}$$

Figure 8. Multipliers used in the extrapolation

2.3.2 The extrapolation method

The overall extrapolation method is based on an underlying assumption that some ports or aquaculture regions are similar with respect to factors that affect marine fishing and aquaculture and activity ancillary to marine fishing and aquaculture in the area. For marine fishing this segmentation is based on the fleet type in ports. Three segments have been defined during this study: i) small scale fleet, ii) industrial fleet and iii) long distance fleet. Based on the characteristics of the fleet of a port, ports in Europe are classified within one of these three segments. For aquaculture four segments have been taken into account, based on the species produced by aquaculture firms: i) marine finfish aquaculture, ii) trout freshwater aquaculture[33], iii) freshwater aquaculture with respect to all other freshwater species and iv) bivalve aquaculture.

Case studies have been divided across Europe over these segments, to take specific segments and their characteristics into account when collecting qualitative and quantitative data. Based on the executed case studies it is considered to be a realistic and accurate assumption, to assume that the defined segments have similar characteristics with regards to the fishery and activity ancillary to fishing and thereby with regards to the employment, income and production multipliers; i.e. the multiplier in long-distance fishing in the Netherlands is the same as the multiplier in long-distance fishing in all other Member States where long-distance fishing takes place. The multipliers are assumed to be normally distributed within each segment, and the data collected on the multipliers for the different segments is assumed to be representative. This assumption is made, such that the average value of the multiplier for each segment can be used, to calculate the total employment and income in EU28 for the segments. Given that the segments have similar characteristics with regards to fishery and activity ancillary to fishing, this is considered a robust assumption.[34] Finally, it is assumed that the chosen cases are representative for the distribution of multipliers in all EU28 ports and aquaculture regions. The cases were chosen to be representative for the sectors and segments. In an early stage of this project these assumptions have been discussed with DG Mare.

The method used for extrapolation can be divided in to three steps. Each step is described below, followed by an example of a calculation following the three steps.

1. In the first step, average multipliers for employment and income are calculated for the marine fishing and aquaculture segments defined during this study, where data is available from the executed case studies.

[33] In the inception report of this project, freshwater aquaculture was described as one segment (including trout). During the case studies it became clear that multipliers for trout freshwater aquaculture and other freshwater aquaculture species included in this study (carp and some sturgeon) differ to a large extent. Trout aquaculture is a very sensitive fish, which makes aquaculture firms very reluctant to include other businesses and people near their production sides and consequently perform a lot of activities themselves with minimal involvement of ancillary service companies. For other species of freshwater aquaculture included the fish is less sensitive and more ancillary services are asked, reflecting in higher multipliers than trout freshwater aquaculture. Therefore, the freshwater aquaculture segment has been split into two segments: trout freshwater aquaculture and other freshwater aquaculture.

[34] The calculated average multipliers for each segment based on the case studies, is assumed to be representative for the average multipliers for the segments for the full population consisting of all the ports or aquauculture regions in Europe. In other words, the cases studied for each segment, are assumed to have approximately the same average multiplier as the average multiplier for the full population of ports or aquaculture regions in Europe.

2. In the second step, the employment and income in the primary sector in the three marine fishing segments are collected for all EU28 Member States. For aquaculture the production in the primary sector in the four segments is collected for all EU28 Member States.
3. In the third step the EU28 employment and income is estimated by multiplying the average multiplier per segment with the employment, income or production in the primary sector in the relevant segment for each of the countries in the EU28.

In Figure 9 this method is explain by a Polish example to marine fishing for the small-scale segment in 2014.

Calculation of FTE in ancillary sector to small-scale marine fishing in Poland in 2014:

Step 1: Employment multipliers have been calculated for 7 small-scale marine fishing case studies for 2014. The average employment multiplier for the studied small-scale ports in 2014 is **0,329**.

Step 2: Data has been collected on employment in the primary sector for small-scale ports in 2014 in Poland. The total employment in FTE is **542**.

Step 3: The total employment in sectors ancillary to marine fishing in Poland in 2014 for the small-scale segment is calculated as 0,329*542 = **178,3**.

Figure 9. Example of how the extrapolation method is used during this study

2.4 OECD analysis

As a final step during this study, as desk research was conducted to compare the European results of the study to six OECD countries (Norway, Iceland, US, Canada, New Zealand and Japan). To gather data for these six OECD countries, a structured desk research is conducted in the same way as described as web search in paragraph 2.1. Relevant data and studies are gathered by searching the Internet and databases for published material. For this web search, the same search strings are used as described in paragraph 2.1 to target the type of data relevant for this study. These strings – and synonyms of these strings using the Google Search Engine – have been translated in the native languages of these countries to search for both national and regional data[35]. Figure 10 and Figure 11 – once more – show the different strings used during the web search.

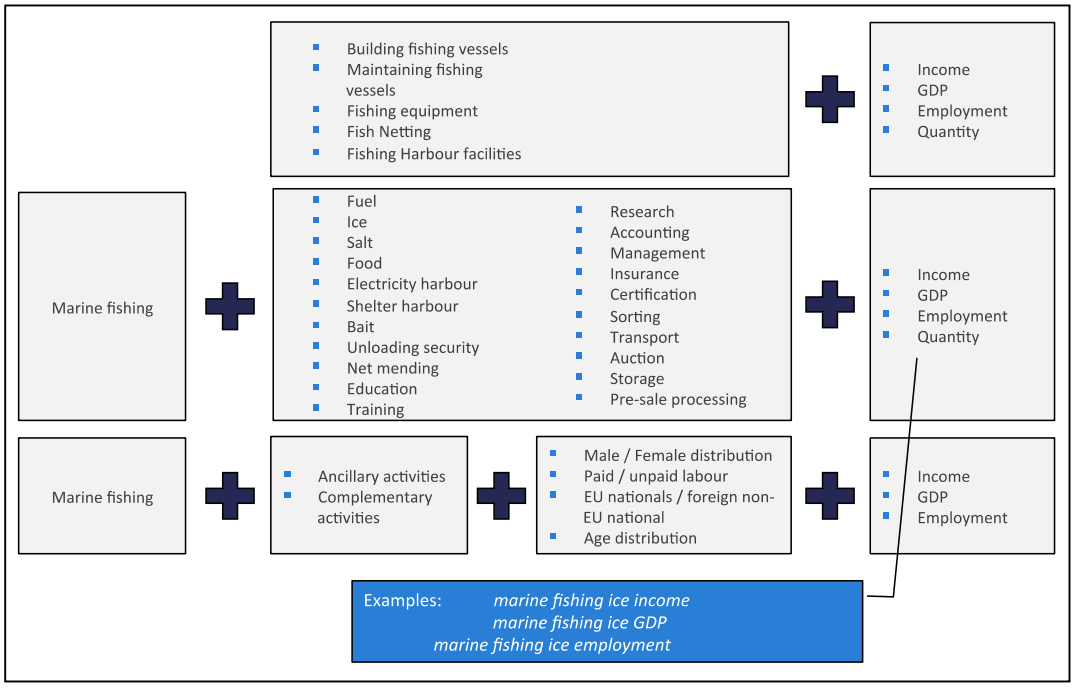


Figure 10. Used strings in desk research: Marine fishing

[35] Please note that this has only be done using the latin alphabet.

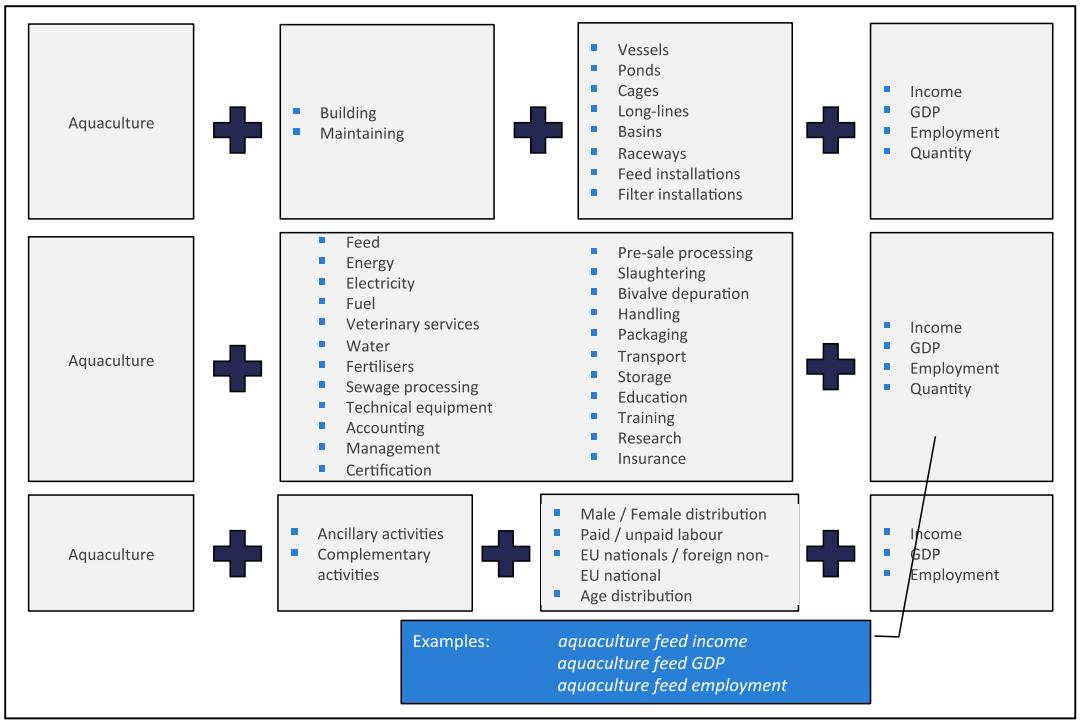


Figure 11. Used strings in desk research: Aquaculture

It should be noted that the strings (e.g. aquaculture feed employment) did not provide a lot of usable data for these six OECD countries. Most data were found by using the more general key words, such as “ancillary services”. When data was found, it was difficult to link this data to some general baseline of data of the sector. A lot of definitions used during the studies were not comparable to the definition used of ancillary services during this study. In the end, data and multipliers are included in this OECD desk research as well as the definition used of ancillary services during the specific study. The results are compared to study results, and described in chapter 6 of this report.

3 The ancillary industry in marine fishing

3.1 Data used

This section describes the main indicators and data sources used to estimate employment and income related to the sector ancillary to marine fishing in the European Union, where first the number of multipliers collected are discussed. Subsequently, external data sources and the primary data used are discussed and this section concludes with an explanation on how the results are presented in the remainder of Chapter 3. Please note that the analysis provided in this section uses findings collected from the case studies as well as findings collected from the desk research performed in this study. In Annex IV the data collected from the desk research is presented separately.

3.1.1 Number of multipliers

Case studies in marine fishing have been performed at the port level related to three different segments: i) small-scale fishing, ii) industrial fishing, and iii) long-distance fishing. For each of these segments, information – at a port level – about employment, income and other socio-economic characteristics (e.g. gender distribution, education level, et cetera) related to both the primary sector and the ancillary sector has been collected and stored in a database[36]. Data has been collected for both 2009 and 2014 to also enable analysis on the development over time related to the abovementioned segments and variables[37]. In the end, information collected from individual case studies is used for extrapolation of figures to the level of the European Union. To be able to do this, data related to employment (in FTE) and income in the primary sector in each of the segments has also been collected.

Please note that in the remainder of this section, employment is measured in full time equivalents (FTE) – i.e. the number of full time positions – and income is measure in million Euro, where 1 FTE is defined as 2.000 hours per year[38,39]. Measuring employment in FTE means, that any part-time positions are summed to create a measure of the number of FTE in the sector (e.g. an employee working 1.000 hours per year, is defined as 0,5 FTE).

	Employment multiplier		Income multiplier	
	2009	2014	2009	2014
Marine fishing	**21**	**24**	**8**	**10**
Small-scale	6	7	3	4
Industrial	11	13	3	4
Long-distance	4	4	2	2

Figure 12. Number of calculated multipliers in marine fishing (Source: Case studies)

Figure 12 reveals that the number of multipliers collected from the case studies is limited, where especially data related to income in the different segments is available to a limited extent. For instance, when looking at long-distance fishing, only 2 income multipliers for both 2009 and 2014 were collected out of the 4 case studies performed in this segment. Not all Member States have registers or databases which publish income data of companies and during some case studies it proved to be sensitive information to gather, hence not all enterprises provided this information. Therefore, not all case studies provided the desired results on income figures. In the end, the obtained multipliers provide an important baseline of data for the extrapolation of figures to the European Union and Member States. When the number of multipliers is limited, the overall reliability of estimated figures based on extrapolation will decrease; resulting in a larger bandwidth of final results. This is important to bear in mind when analysing the results presented in this section.

[36] The sources consulted during the case studies are presented in Annex III

[37] Please note that for the case study of marine finfish aquaculture in Murcia and freshwater aquaculture in Castilla-Léon data for 2013 is used in place of data from 2014, since this is the newest available data for these regions.

[38] http://www.fao.org/fishery/cwp/handbook/G/en.

[39] http://datacollection.jrc.ec.europa.eu/dc-socioeco/var/employment

3.1.2 External data sources

For each case study, data has been collected on the primary sector with respect to production, employment and income. In the end, the combination of data on the primary sector and data on the ancillary sector enables to calculate multipliers needed for the extrapolation of data. Unfortunately, it has not been possible to collect data for 2009 and 2014 for all the case studies. In some cases data on a different year has therefore been collected instead.

For the Member States where data is not available for 2009 and/or for 2014, but data exists for at least two years, a linear interpolation is used to estimate the employment in the year(s) with missing data. E.g. for the industrial port in Ancona, Italy data is only available for the years 2012 and 2014. In this period the average yearly growth was -4 percent. Therefore the data on employment for 2012 is adjusted to take in to consideration this development and the employment in 2009 is calculated as: employment 2009 = (employment in 2012)*(104 percent)$^{(2012-2009)}$. If there is only one year with data the growth in the specific port or region is unknown, and the missing value cannot be estimated.

To enable the extrapolation of the results, data on the primary sector, has furthermore been collected from external data sources, for all of the EU28 Member States. Data on production, employment and/or income in the primary sector is needed in the extrapolation. The available and chosen data sources for external data are described for marine fishing in the remainder of this section.

In marine fishing, there are three possible sources of primary data, where each of them are described in this paragraph.

Data source 1: *The Food and Agriculture Organisation of the United Nations - Database of global marine fishing production*

The Food and Agriculture Organization of the United Nations (FAO) has a database of global production. Unfortunately, this data is not suited for the extrapolation of data in this study, since the production, employment and income cannot be divided between the three marine fishing segments; e.g. small-scale ports, industrial ports and long-distance ports. Thus if using data from the FAO, it would not be possible to use different multipliers for the different segments, which is likely to make the extrapolation less precise.

Data source 2: *The Fleet Register on the Net*

The Fleet Register on the Net (FRONT) contains data on the production capacity at the different ports. Assuming that production capacity is equal to the real production in a port, employment and income can be estimated at the port level. However, this assumption proved invalid after thorough analysis, where – in reality – real production is a lot different from the production capacity of a port. Another constraint with respect to this data source is that it is not possible to identify the long-distance fleet.

Data source 3: *Scientific, Technical and Economic Committee for Fisheries - Annual Economic Reports*

In the end, data from Annual Economic Reports (AER) of the Scientific, Technical and Economic Committee for Fisheries (STECF) is used in the extrapolation of case study results. The AER contains data on employment and income and it is therefore possible to use the employment and income multipliers gathered during the case studies. The data is available for all three segment for all Member States, making it possible to use different multipliers for the different segments, increasing the precision of the overall extrapolation. Please note that the STECF themselves point out, that there are some quality issues with the data. The data is reported by Member States and quality assured by the JRC or experts, but still some issues remain. Specifically, the countries Bulgaria, Croatia, Cyprus, Estonia, France, Greece, Malta and Spain either have missing data or quality issues. Thus employment levels and income levels are unfortunately not available for 2009 and 2014 for all of the EU28 Member States.[40] In the end, data is only available at Member State level and therefore results are only provided per segment, per Member State and not at a regional level.

[40] Therefore a linear interpolation, as described earlier, is used to estimate the data for 2009 and/or 2014 if missing. The average yearly development in employment and income in the period 2008-2013, is used in the interpolation if data is available. If not, the longest period available is used, where 2008 is the earliest year with data.

3.1.3 Primary data related to marine fishing

As is being explained in Paragraph 3.1.2, the extrapolation is based on primary data related to employment (in FTE) and income (in million Euro) in the primary sector. In the end, the figures presented in Figure 13 are used to calculate employment and income multipliers (ancillary employment/income divided by primary employment/income) and form the basis of the extrapolation of the case study results to Member States and the European Union.

	Employment (in FTE)		Income (in million Euros)	
	2009	2014	2009	2014
Marine fishing	**123.158**	**108.651**	**6.787**	**6.987**
Small-scale	48.039	47.002	989	795
Industrial	66.282	55.380	4.917	4.823
Long-distance	8.837	6.269	881	1.368

Figure 13. Primary sector data related to marine fishing (Source: STECF)

3.1.4 Presentation of results

In presenting the results of the extrapolation, 90% confidence intervals will be used. The confidence intervals are presented to express the uncertainty about the estimates. The 90 % confidence intervals are based on confidence intervals for the estimated multipliers. The confidence interval is calculated based on the variation in the multipliers and the number of observations. The interval will be smaller, the lower the variation in the multipliers and the larger the number of observations. Statistically there is a 90 % probability that the actual employment and income in ancillary sectors to fishery are within the presented confidence interval. It can therefore be said, with 90 % percent certainty that the employment and income are within the presented intervals.

When analysing differences between the presented estimates, either over years or between segments it is important to note, whether the analysed difference is significant or not. In the remainder of this chapter, a difference is defined to be significant, if the confidence intervals of the two estimates are not overlapping. E.g. if comparing an estimate with a confidence interval of 135-1,002 to an estimate with a confidence interval of 116-740, there is no significant difference between the two estimates. If the difference is not significant, it cannot be said with 90 % certainty that there is a difference, in other words, the uncertainty about the estimates is too high, to conclude that there is a difference between the estimates.

3.2 Employment in the ancillary industry

Combined with ancillary income, ancillary employment is an important factor in determining the economic importance of the sector ancillary to marine fishing, where ancillary employment is estimated at several levels. First of all, employment is estimated in terms of the different segments (e.g. small-scale fleet, industrial fleet, and long-distance fleet) and subsectors (e.g. supplies for the operation, R+D+I services, et cetera). Second, employment is estimated on different geographical dimensions; e.g. at the level of the European Union, at the level of the Member State, and at the level of individual case studies, including data collected from the desk research. Finally, ancillary employment related to marine fishing is estimated for both 2009 and 2014.

As was explained in Paragraph 3.1.1 of this section, employment in the ancillary sector is estimated using employment multipliers that were collected from the case studies. The average employment multiplier per segment multiplied by the employment in the primary sector in each segment and Member State will in the end result in an estimation of ancillary employment (see Figure 13 for the primary data used). Figure 14 presents the average employment multipliers that were calculated based on the case studies and used in the estimation of ancillary employment, including the number of multipliers collected[41,42].

In the end, the multiplication of primary employment in each segment with the multipliers presented in Figure 14 results in estimations of employment in each of the aforementioned segments, geographical dimensions

[41] Unfortunately, due to unavailability no employment multipliers could be collected from 3 case studies related to 2009; 1 in small-scale fishing and 2 in industrial fishing.

[42] The size of the multiplier will be discussed in further detail in the regional analysis in this paragraph.

and years. With respect to the subsectors, ancillary employment is calculated by taking a percentage of employment in each subsector in the ancillary industry against total estimated employment in the ancillary sector. This is done for each case study, where an average percentage across all case studies per subsector is taken to end up with one percentage per subsector[43]. These percentages are presented in Figure 15[44].

Segment	Average employment multiplier		Number of multipliers	
	2009	2014	2009	2014
Marine fishing	**0,2731**	**0,3255**	**21**	**24**
Small-scale port	0,3062	0,3290	6	7
Industrial port	0,2721	0,3509	11	13
Long-distance port	0,2264	0,2372	4	4

Figure 14. Multipliers collected from case studies per segment, including the number of collected multipliers

Subsector	Average % (2009)	Average % (2014)
Activities related to servicing of equipment and / or vessels	**57%**	**54%**
Building and maintaining fishing vessels	37%	36%
Technical equipment	9%	8%
Netting	11%	10%
Supplies for the operation	**17%**	**16%**
Fuel	10%	8%
Ice and salt	3%	4%
Port facilities	4%	4%
R + D + I Services	**7%**	**6%**
Education, research and training	3%	2%
Accounting	1%	1%
Management	2%	2%
Insurance	1%	1%
Activities related to the sale of fish	**19%**	**24%**
Sorting	2%	2%
Transport	2%	3%
Auctioneering	1%	1%
Fish trade	5%	5%
Storage	0%	3%
Pre-sale processing	6%	6%
Packaging	3%	4%

Figure 15. Subsectors in marine fishing, including percentage of total ancillary employment

This remainder of this paragraph discusses each dimension on the different geographical levels separately, where first employment at the level of the European Union is discussed, after which the Member State level and regional – case study level – are discussed. Furthermore, in each paragraph the different segments and subsector are discussed. At the regional level, data collected from the desk research will also be taken into

[43] For instance, when 4 FTE is found in netting in case study X and the total number of FTE in the ancillary sector in case study X is 10 FTE, netting represents 40% of the employment in the ancillary sector in case study X. These percentages are calculated for netting in each case study and subsequently an average percentage for netting is taken to find one percentage for netting.

[44] The division of employment over the subsectors in marine fishing will be discussed in further detail in the subsequent paragraphs in this section.

account when available and definitions match the definition of ancillary services of this study. In the end, the results are presented in tables as well as geographical maps[45], including a qualitative interpretation.

3.2.1 Employment in the EU, including segments and subsectors

Based on the average multipliers and primary employment in marine fishing, total ancillary employment in the European Union was estimated as well as ancillary employment per segment in marine fishing. The results of these estimations are presented in this paragraph, where figures on ancillary employment are provided for marine fishing as a whole, for each segment, and for each of the subsectors identified in the ancillary sector.

In Figure 16, total estimated ancillary employment is presented as well as 90% confidence intervals of these estimations. As explained before, using the confidence intervals it can be said that there is a 90% probability that the employment falls within the presented intervals. In other words, the smaller the 90% confidence interval is, the more reliable the presented total estimated employment figures are.

	Employment (in FTE)	
	2009	2014
Marine fishing	**34.746 (20.826 - 48.666)**	**36.381 (20.375 - 52.387)**
Small-scale fleet	14.708 (7.519 - 21.897)	15.462 (7.329 - 23.594)
Industrial fleet	18.038 (12.797 - 23.279)	19.432 (12.623 - 26.242)
Long-distance fleet	2.000 (510 - 3.491)	1.487 (423 - 2.550)

Figure 16. Employment in the sector ancillary to marine fishing

Overall, the sector ancillary to marine fishing is estimated to employ about 34.750 FTE in 2009, and about 36.400 FTE in 2014. Although this seems like a small increase in overall employment, looking at the confidence intervals, this increase is not statistically significant[46]. In other words, there is too much uncertainty to conclude that employment has increased in the sector ancillary to marine fishing. Looking at the segments, small-scale fishing is estimated to employ – in 2009 and 2014 – around 15.000 FTE and industrial fishing around 19.000 FTE. In long-distance fishing, it seems like there has been a decrease in overall employment; from 2.000 FTE to ~1.500 FTE.

When comparing the level of ancillary employment in the different segments, only long-distance fishing seems to employ significantly less FTE than industrial fishing and small-scale fishing, where no significant difference in employment has been found between small-scale fishing and industrial fishing.

Using the percentages presented in Figure 15, total ancillary employment is also estimated for each of the subsectors identified in marine fishing (see Figure 17). From Figure 17 it becomes clear that the activities related to servicing of equipment and/or vessels is the biggest subsector in terms of employment, followed by activities related to the sale of fish, supplies for the operation and R+D+I services. When looking at each of the subsectors in more detail, the most prominent sources of employment in the ancillary sector are building and maintaining fishing vessels, technical equipment, netting, and fuel. Taking into account the kind of activities performed by fishermen and the equipment and supplies needed, this is a logical outcome. In general, fishermen rely on their fishing equipment and fishing vessels and considering that some equipment is very specialised, this is mostly outsourced to specialised ancillary providers, which is also reflected in the figures provided in Figure 17.

Subsector[47]	**Employment (in FTE**	
	2009	**2014**
Total	**34.747**	**36.379**

[45] Please note that Cyprus is not presented in the geographical maps, while it is taken into account, and presented in the tables, in the estimation of ancillary income and employment.

[46] Increases or decreases are statistically not significant when confidence between two estimated values overlap.

[47] Please note that small differences in the presented figures may occur, due to rounding differences.

Subsector[47]	Employment (in FTE	
	2009	2014
Activities related to servicing of equipment and / or vessels	**19.649**	**19.342**
Building and maintaining fishing vessels	12.783	12.901
Technical equipment	3.136	3.066
Netting	3.730	3.383
Supplies for the operation	**5.974**	**5.925**
Fuel	3.304	2.988
Ice and salt	1.121	1.327
Port facilities	1.549	1.610
R + D + I Services	**2.295**	**2.203**
Education and training	863	856
Accounting	450	314
Management	550	586
Insurance	380	403
Certification	52	44
Activities related to the sale of fish	**6.829**	**8.909**
Sorting	866	685
Transport	825	1.220
Auctioneering	346	516
Fish trade	1.571	1.675
Storage	145	1.199
Pre-sale processing	2.095	2.332
Packaging	981	1.282

Figure 17. Employment in subsectors in the sector ancillary to marine fishing

3.2.2 Employment in Member States, including segments and subsectors

Using the same method used for the estimation of ancillary employment at the level of the European Union, ancillary employment can also be estimated for each Member State, of which the results are presented in a table in Figure 18 – including 90% confidence intervals – and in a geographical map in Figure 19.

Member State	Employment (in FTE)	
	2009	2014
Austria	N/A (-)	N/A (-)
Belgium	85 (60 - 110)	82 (54 - 111)
Bulgaria	428 (234 - 623)	120 (63 - 177)
Croatia	784 (488 - 1.081)	803 (488 - 1.117)
Cyprus	237 (129 - 345)	222 (110 - 335)
Czech Republic	N/A (-)	N/A (-)
Denmark	515 (346 - 685)	556 (348 - 764)

Member state	Employment (in FTE)	
	2009	2014
Italy	6.395 (3.909 - 8.882)	6.539 (3.716 - 9.361)
Latvia	160 (94 - 227)	144 (79 - 209)
Lithuania	136 (61 - 211)	102 (48 - 157)
Luxemburg	N/A (-)	N/A (-)
Malta	45 (30 - 60)	64 (32 - 97)
Netherlands	480 (335 - 625)	611 (390 - 831)
Poland	430 (253 - 608)	509 (286 - 732)

Member State	Employment (in FTE)	
	2009	2014
Estonia	158 (94 - 222)	177 (95 - 260)
Finland	67 (39 - 95)	116 (62 - 170)
France	2.545 (1.573 - 3.518)	2.358 (1.372 - 3.344)
Greece	5.950 (3.242 - 8.658)	7.960 (4.107 - 11.813)
Germany	353 (222 - 483)	437 (248 - 627)
Hungary	N/A (-)	N/A (-)
Ireland	865 (537 - 1.193)	944 (540 - 1.349)

Member state	Employment (in FTE)	
	2009	2014
Portugal	2.470 (1.551 - 3.388)	2.374 (1.409 - 3.339)
Romania	10 (5 - 14)	13 (7 - 19)
Slovakia	N/A (-)	N/A (-)
Spain	9.667 (5.665 - 13.669)	9.318 (5.147 - 13.490)
Slovenia	24 (14 - 34)	27 (14 - 41)
Sweden	290 (183 - 398)	293 (173 - 414)
United Kingdom	2.652 (1.763 - 3.540)	2.610 (1.587 - 3.632)

Figure 18. Employment in the sector ancillary to marine fishing per Member State

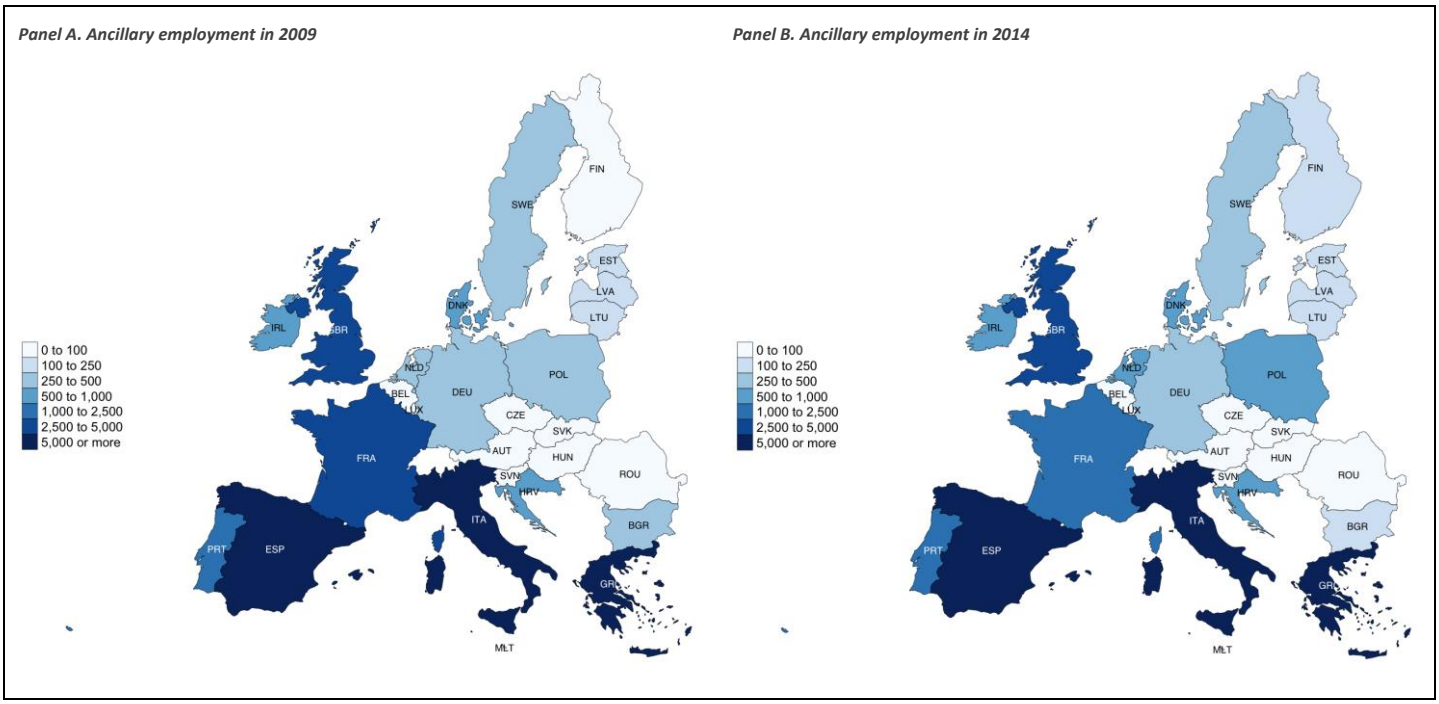


Figure 19. Geographical map of ancillary employment in marine fishing

What becomes clear from Figure 18 and Figure 19 is that Spain, Greece and Italy are the Member States with the highest employment levels looking at the ancillary sector, where especially Spain – taking into account the confidence intervals – generates significantly higher employment compared to other Member States (excluding Greece and Italy). Other countries with significant employment in the ancillary sector are France, Portugal and the United Kingdom. Please note that, looking at the confidence intervals, Spain, Greece, and Italy do not significantly differ from each other[48]. The same can be said for employment levels in France, Portugal and the United Kingdom.

Looking at differences between 2009 and 2014 it is noteworthy that only Bulgaria shows a significant decrease in employment, due to a sharp decrease in employment in the primary sector of approximately 75%. In all other Member States, no significant increase or decrease in employment has been found. In other words, employment in the ancillary sector is quite stable throughout the European Union.

The division of ancillary employment over the subsectors in marine fishing is presented in Figure 20 and is also presented in geographical maps in Figure 21 and Figure 22. In general – in line with the results presented on an

[48] Only when confidence intervals do not overlap, one can speak of a significant difference.

EU-level – most employment is generated in activities related to the servicing of equipment and/or vessels, where especially in Spain, Greece and Italy significant employment is found in this subsector; approximately 35% (23%) of total ancillary employment is active in the servicing of equipment and/or vessels (building and maintaining fishing vessels) in Spain, Greece or Italy[49]. When comparing employment generated in subsectors in 2009 and 2014, no significant differences are found. In other words, the employment levels in the different subsectors seem to be relatively constant over the years.

Member State[50]	Total		Activities related to servicing of equipment and / or vessels		Supplies for the operation		R + D + I Services		Activities related to the sale of fish	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**34.747**	**36.379**	**19.649**	**19.342**	**5.974**	**5.925**	**2.295**	**2.203**	**6.829**	**8.909**
Austria	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	**85**	**82**	48	44	15	13	6	5	17	20
Bulgaria	**428**	**120**	242	64	74	20	28	7	84	29
Croatia	**784**	**802**	444	427	135	131	52	49	154	197
Cyprus	**237**	**222**	134	118	41	36	16	13	47	54
Czech Republic	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	**515**	**556**	291	296	89	91	34	34	101	136
Estonia	**158**	**177**	89	94	27	29	10	11	31	43
Finland	**67**	**116**	38	62	12	19	4	7	13	28
France	**2.545**	**2.358**	1.439	1.254	438	384	168	143	500	577
Germany	**353**	**437**	199	232	61	71	23	26	69	107
Greece	**5.950**	**7.960**	3.365	4.232	1.023	1.296	393	482	1.169	1.949
Hungary	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	**865**	**944**	489	502	149	154	57	57	170	231
Italy	**6.395**	**6.538**	3.617	3.476	1.100	1.065	422	396	1.257	1.601
Latvia	**160**	**144**	91	76	28	23	11	9	32	35
Lithuania	**136**	**102**	77	54	23	17	9	6	27	25
Luxemburg	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**45**	**64**	25	34	8	10	3	4	9	16
Netherlands	**480**	**611**	271	325	83	99	32	37	94	150
Poland	**430**	**509**	243	271	74	83	28	31	85	125
Portugal	**2.470**	**2.374**	1.397	1.262	425	387	163	144	485	581
Romania	**10**	**13**	5	7	2	2	1	1	2	3
Slovakia	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	**24**	**27**	13	15	4	4	2	2	5	7
Spain	**9.667**	**9.318**	5.466	4.954	1.662	1.518	638	564	1.900	2.282
Sweden	**290**	**293**	164	156	50	48	19	18	57	72
United Kingdom	**2.652**	**2.609**	1.500	1.387	456	425	175	158	521	639

Figure 20. Employment per subsector in the sector ancillary to marine fishing

[49] A further division of employment beyond the subsectors shown in Figure 20, is provided in Annex V

[50] Please note that small differences in the presented figures may occur, due to rounding differences.

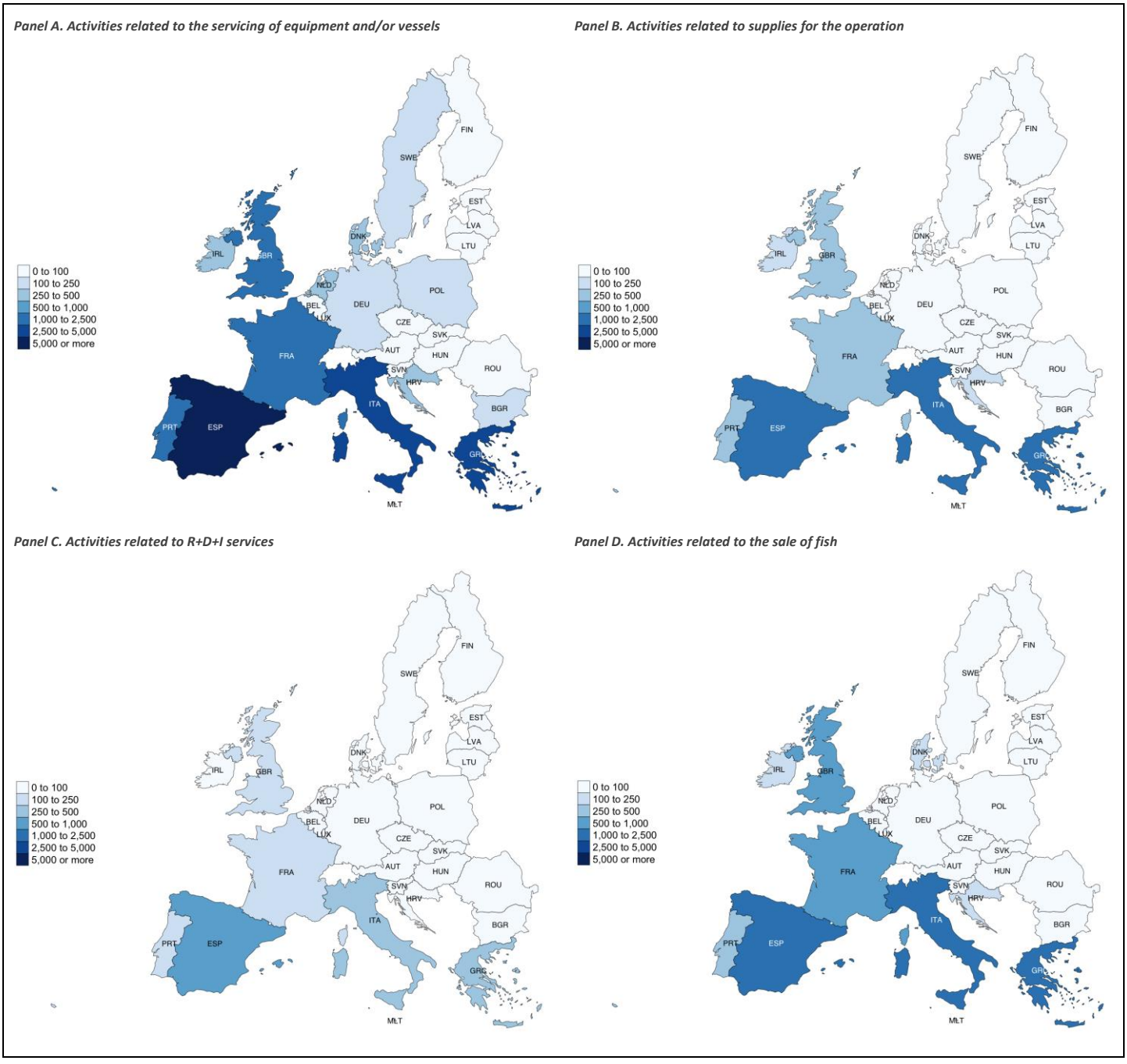


Figure 21. Employment per sub-activity in the sector ancillary to marine fishing in 2009

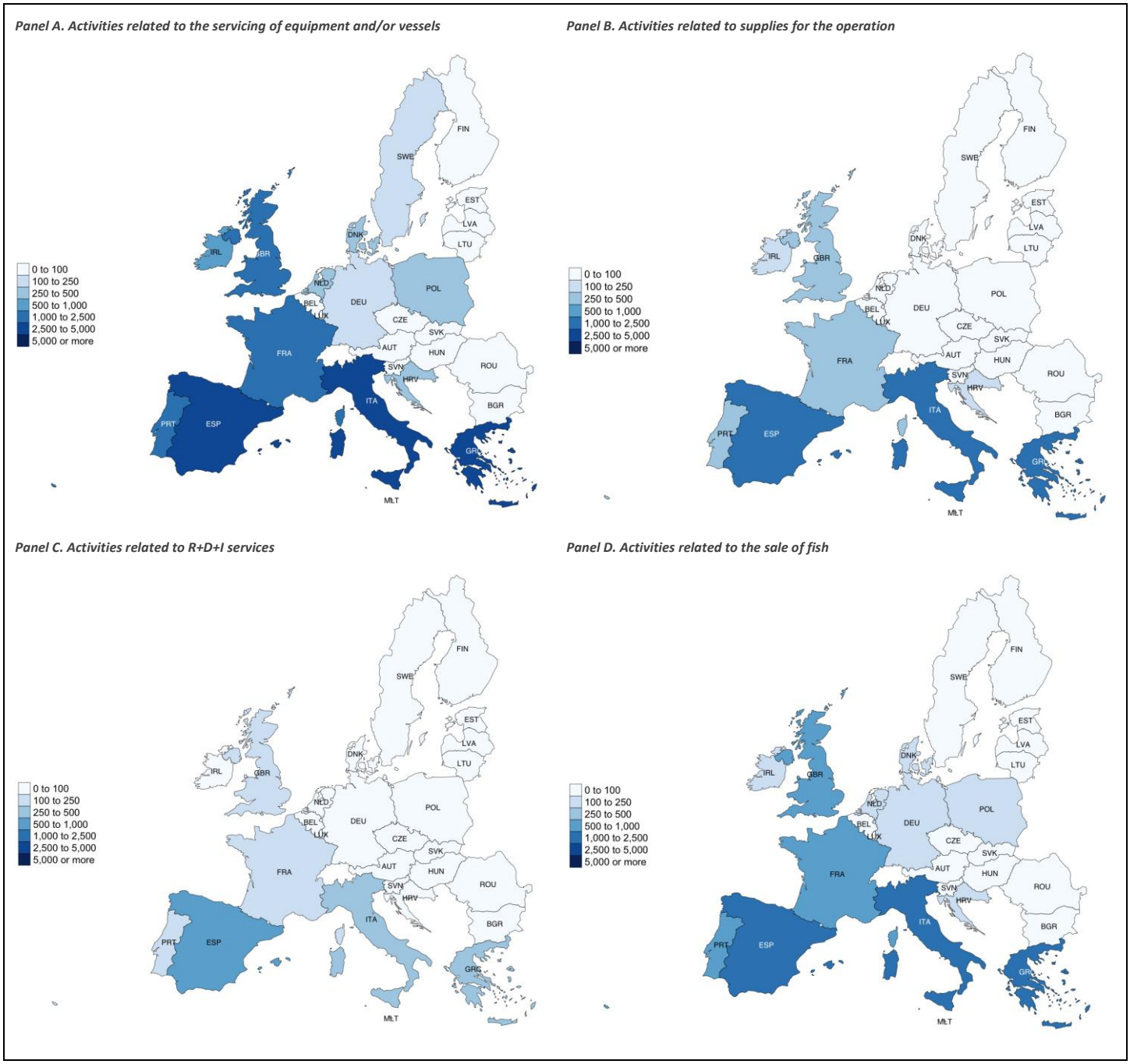


Figure 22. Employment per sub-activity in the sector ancillary to marine fishing in 2014

3.2.3 Regional overview and contribution to local economies

As explained before, the estimates related to employment generated in the sector ancillary to marine fishing on the level of the European Union as well as on a Member State level, were based on case studies performed throughout the European Union. In this paragraph, a regional overview of employment data and employment multipliers are presented in both table-form (Figure 23) and geographical maps (Figure 24 and Figure 25), where data is further complemented with usable findings from the desk research performed in this study. In addition, in Figure 23, the data is also divided over sea basins.

In the geographical maps each point represents a case study or data collected from the desk research, where from the desk research, only multipliers could be collected. Hence, only in the geographical maps on employment multipliers – Figure 25 – data related to the desk research is presented[51].

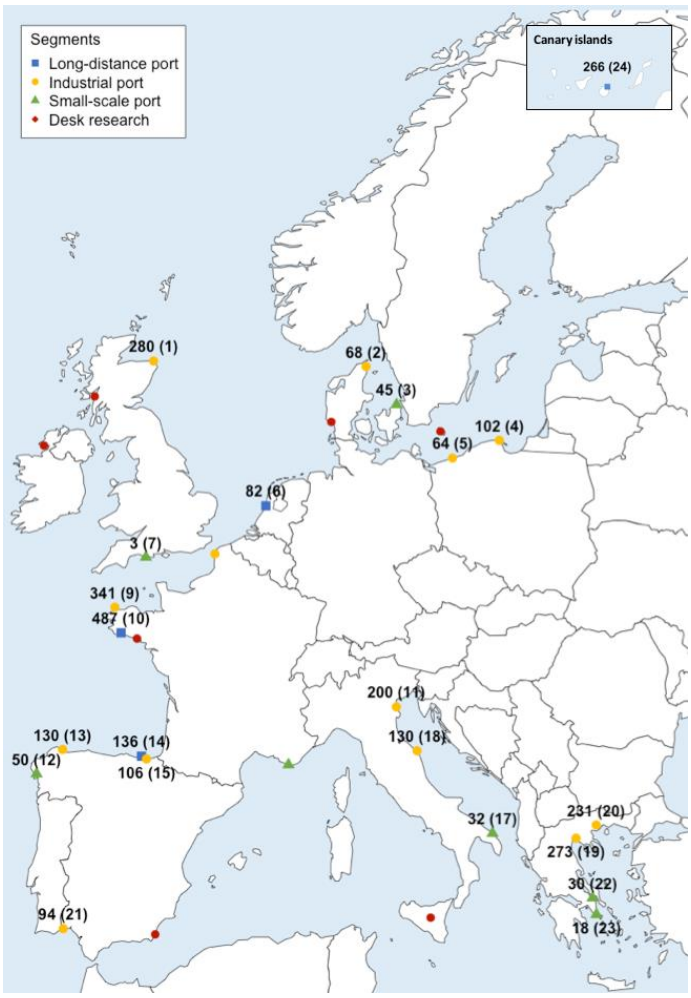
Country	Port	Segment	Ancillary employment		Employment multiplier	
			2009	2014	2009	2014
Baltic Sea						
Denmark	Bornholm	Desk research			0,43	
Denmark	Gilleje	Small-scale port	45	35	0,75	0,97
Denmark	Strandby	Industrial port	68	103		1,14
Poland	Kolobrzeg	Industrial port	64	92	0,09	0,14
Poland	Wladyslawowo	Industrial port	102	61	0,53	0,42
Mediterranean Sea						
France	Hyeres	Small-scale port		7		0,18
Greece	Kavala	Industrial port	231	191	0,47	0,45
Greece	Lavrio	Small-scale port	18	20	0,23	0,26
Greece	Mihaniona	Industrial port	273	253	0,40	0,38
Greece	Oropos	Small-scale port	30	21	0,39	0,36
Italy	Ancona	Industrial port	130	130	0,07	0,09
Italy	Brindisi	Small-scale port	32	32	0,27	0,32
Italy	Chioggia	Industrial port	200	135	0,06	0,05
Italy	Sicily	Desk research			0,56	
Spain	Carboneras	Desk research			0,22	
North Sea						
Denmark	Esbjerg	Desk research			0,46	
Netherlands	IJmuiden	Long-distance port	82	85	0,11	0,11
United Kingdom	Fraserburgh	Industrial port	280	297	0,39	0,44
Noth Atlantic Ocean						
France	Auray	Desk research			0,24	
France	Boulogne	Industrial port		100		0,17
France	Concarneau	Long-distance port	487	338	0,56	0,57
France	Guilvinec	Industrial port	341	337	0,34	0,41
Spain	Bermeo	Long-distance port	136	127	0,22	0,24

[51] Please note that a port in the geographical map that is presented without data, means that no data on either employment or employment multipliers could be collected related to this port.

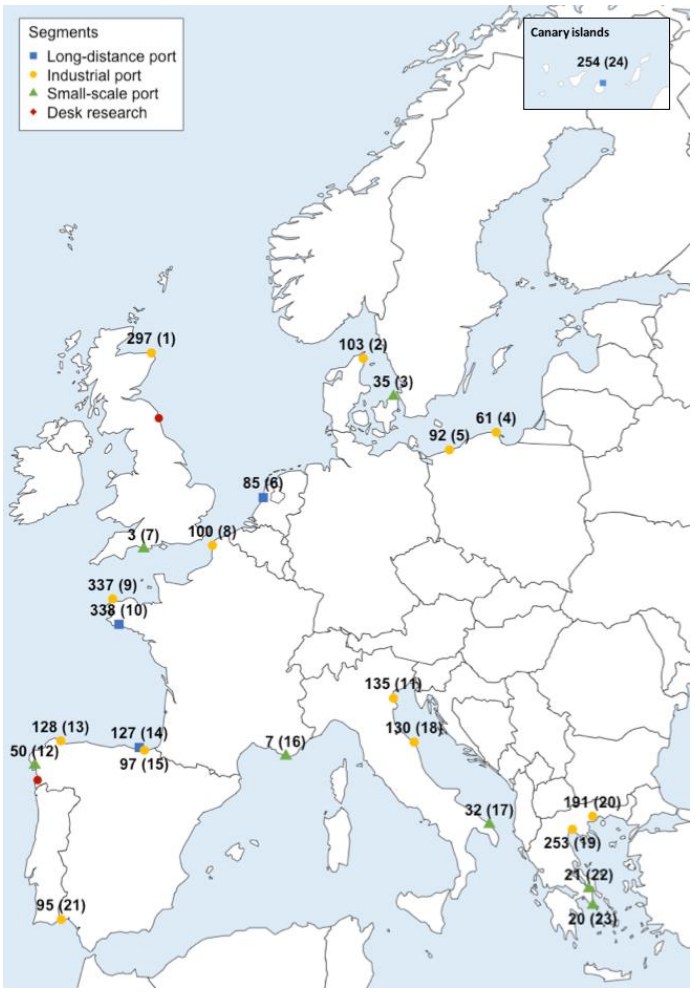
Country	Port	Segment	Ancillary employment		Employment multiplier	
			2009	2014	2009	2014
Spain	Burela	Industrial port	130	128	0,27	0,30
Spain	Isla Cristina	Industrial port	94	95	0,12	0,13
Spain	Las Palmas	Long-distance port	266	254	0,02	0,03
Spain	Noia	Small-scale port	50	50	0,13	0,13
Spain	Ondarroa	Industrial port	106	97	0,26	0,43
Spain	Vigo	Desk research				0,58
United Kingdom	Amble	Desk research				1,00
United Kingdom	Oban	Desk research			0,35	
United Kingdom	Weymouth	Small-scale port	3	3	0,08	0,09

Figure 23. Regional analysis marine fishing - Employment

Panel A. Ancillary employment in 2009



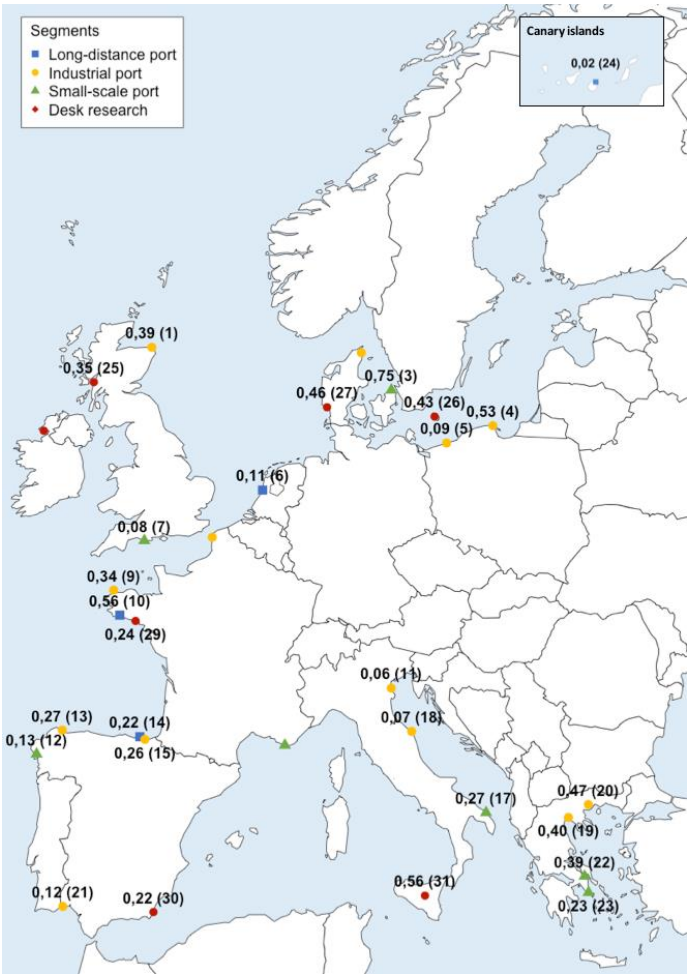
Panel B. Ancillary employment in 2014



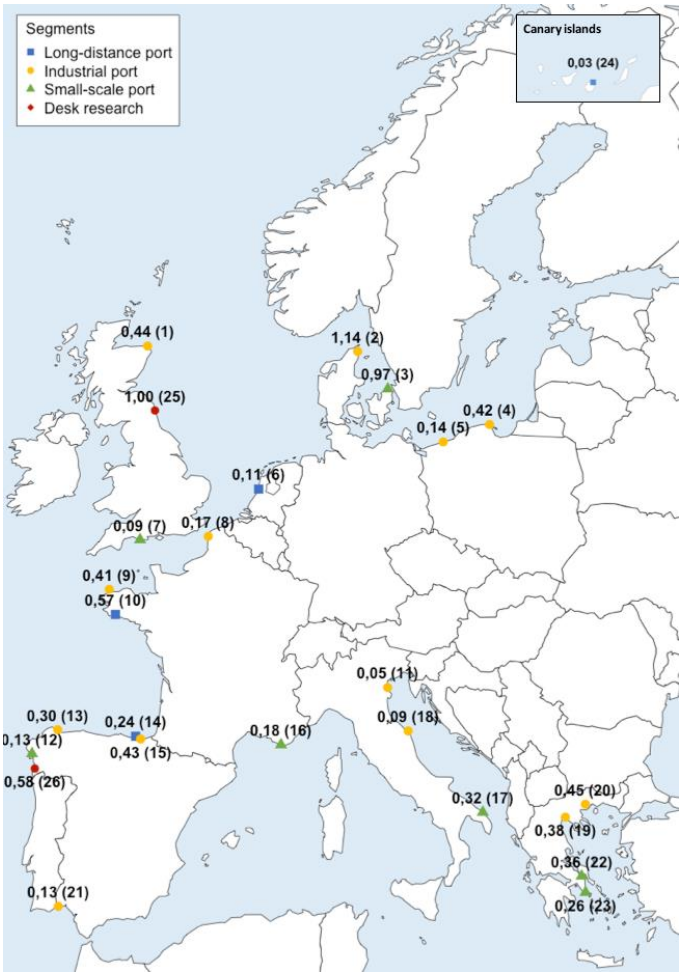
(1)Fraserburgh, United Kingdom (2) Strandby, Denmark (3) Gilleje, Denmark (4) Wladyslawowo, Poland (5) Kolobrzeg, Poland (6) IJmuiden, Netherlands (7) Weymouth, United Kingdom (8) Boulogne, France (9) Guilvinec, France (10) Concarneau, France (11) Chioggia, Italy (12) Noia, Spain (13) Burela, Spain (14) Bermeo, Spain (15) Ondarroa, Spain (16) Hyeres, France (17) Brindisi, Italy (18) Ancona, Italy (19) Mihaniona, Greece (20) Kavala, Greece (21) Isla Cristina, Spain (22) Oropos, Greece (23) Lavrio, Greece (24) Las Palmas, Spain (25) Oban, United Kingdom (26) Bornholm, Denmark (27) Esbjerg, Denmark (28) Killybegs, Ireland (29) Auray, France (30) Carbonera, Spain (31) Sicily, Italy

Figure 24. Regional overview of employment in activities ancillary to marine fishing (source: Desk research & Case studies)

Panel A. Ancillary employment multipliers in 2009



Panel B. Ancillary employment multipliers in 2014



(1)Fraserburgh, United Kingdom (2) Strandby, Denmark (3) Gilleje, Denmark (4) Wladyslawowo, Poland (5) Kolobrzeg, Poland (6) IJmuiden, Netherlands (7) Weymouth, United Kingdom (8) Boulogne, France (9) Guilvinec, France (10) Concarneau, France (11) Chioggia, Italy (12) Noia, Spain (13) Burela, Spain (14) Bermeo, Spain (15) Ondarroa, Spain (16) Hyeres, France (17) Brindisi, Italy (18) Ancona, Italy (19) Mihaniona, Greece (20) Kavala, Greece (21) Isla Cristina, Spain (22) Oropos, Greece (23) Lavrio, Greece (24) Las Palmas, Spain (25) Oban, United Kingdom (26) Bornholm, Denmark (27) Esbjerg, Denmark (28) Killybegs, Ireland (29) Auray, France (30) Carbonera, Spain (31) Sicily, Italy

Figure 25. Regional overview of employment multipliers in activities ancillary to marine fishing (source: Desk research & Case studies)

In Figure 24 the estimated ancillary employment is presented in a geographical map. In terms of interpretation, when looking for instance at the port of IJmuiden in the Netherlands, 82 FTE (85 FTE) was found in the sector ancillary to marine fishing in 2009 (2014). With respect to Figure 25, each point on the geographical map represents an employment multiplier. Hence, when looking for instance at Isla Cristina in Spain, an employment multiplier of 0,12 (0,13) was found in 2009 (2014). Meaning, for each fishermen in the port of Isla Cristina in Spain, the sector ancillary to marine fishing was estimated to employ 0,12 FTE (0,13 FTE) in 2009 (2014).

From the multipliers presented in Figure 25, it can be concluded that the employment multipliers in small-scale ports and industrial ports seems to be somewhat higher compared to multipliers found in long-distance ports; averages for the both 2009 and 2014, the average employment multiplier in a small-scale port was around 0,31, the average employment multiplier in an industrial port was around 0,30, and the average multiplier in long-distance ports was around 0,23. The lower employment multiplier in long-distance fishing is explained by the fact that this type of fishing seems to depend to a smaller extent on ancillary service providers. Companies active in long-distance fishing are often very large companies that have internalised the most important services they need, such as transport, packaging, storage, cooling facilities, et cetera. Moreover, they do not rely on auctions, since their catch is sold directly to trading companies. In small-scale fishing and industrial fishing, these kind of activities (e.g. transport, storage, cooling facilities, auction) are mostly outsourced to ancillary companies and therefore a somewhat higher multiplier is found in these segments. Companies active

in long-distance fishing for a large deal also buy services from companies that are located outside the EU, while companies active in industrial and small-scale fishing revert to companies that are located within the EU. This also lowers the multiplier and the overall dependence on EU ancillary providers looking at companies active in long-distance fishing specifically[52].

Looking at differences between Northern Europe and Southern Europe, no conclusive evidence has been found looking at the size of the employment multipliers. The same can be concluded from each sea basin that is represented in Figure 23. What stands out is that the multipliers in Greece and Denmark seem to be higher – and above average – compared to the rest of the Europe. In Denmark these higher multipliers are explained by the fact that ancillary companies in the visited ports seem to also export the services they provide to other regions in Denmark and to other countries, while still being located locally in the port. Hence, relatively higher levels of ancillary employment are found in these ports. For Greece, it seems that ancillary services are mostly provided by firms in hubs, where a lot of ancillary companies are located. These are especially found in the areas with more fishing activity, like Kavala. Hence, like in Denmark, these companies also provide services to other geographical areas – albeit nationally – and therefore higher levels of employment are found in the ancillary sector.

3.2.4 Total number of employees

The estimated ancillary employment levels presented in this section are all calculated in FTEs; this includes both full-time and part-time employment. From previous research[53] it became clear that in marine fishing a significant amount of part-time employees is active, especially in small-scale fishing. This was further substantiated with findings from the case studies, where it was found that fishermen deal with distinct seasonal cycles of abundance and/or availability, since marine fishing is most profitable only during certain periods of each year. During off-season fishermen often are involved in other activities such as fishing on alternative species (e.g. shellfish or seaweeds) or are engaged in other sectors (e.g. agriculture or the construction sector).

These findings are also consistent with the STECF 2014 report on fisheries. In this report, it is concluded that small-scale fishing has relatively more part-time employment than the other segments in marine fishing; the part-time ratio in small scale fleet is 0.61 compared to 0.86 for the Industrial fleet[54,55]. In fact, for most Member States, the low ratio between total number of FTE and the total number of employees observed in the small-scale fishing, suggests that fishing is mostly a part-time occupation in this segment[56].

Looking at the ancillary sector, there is little data available related to the total number of people employed in this industry[57]. Nevertheless, it can be concluded that in the ancillary sector, the part-time ratio is low and lower than the part-time ratio found in the primary sector. Based on the desk research and the case studies, it is estimated that about 90% of the employment in the ancillary sector is full-time employment. The reason behind this high percentage compared to the primary sector, is that the services provided by ancillary companies are often provided to all segments (e.g. small-scale fishing, industrial fishing, and long-distance fishing), often provided services nationally and even internationally and also do not limit itself to the fishing sector only, but also to other sectors. Meaning, the ancillary sector suffers much less from the seasonality that is experienced in the primary sector and thus, employees are for a mostly hired on a full-time basis.

3.2.5 Socio economic data on gender distribution per segment

In terms of gender, the primary sector in marine fishing is dominated by men. During the desk research and the case studies it was found that it is often not commonly accepted for women to be active on board of fishing vessels. This is mainly caused by the physical nature of the work and the fact that fishing is a demanding job in

[52] Companies that are located outside the EU have not been taken into account in this study.

[53] http://www.fao.org/fishery/topic/14753/en

[54] E.g. on average, a fishermen is active in marine fishing for 61% of 2.000 hours in small-scale fishing and for 86% of 2.000 hours in industrial fishing.

[55] The 2014 Annual Economic Report on the EU Fishing Fleet (STECF 14-16)

[56] The 2014 Annual Economic Report on the EU Fishing Fleet (STECF 14-16)

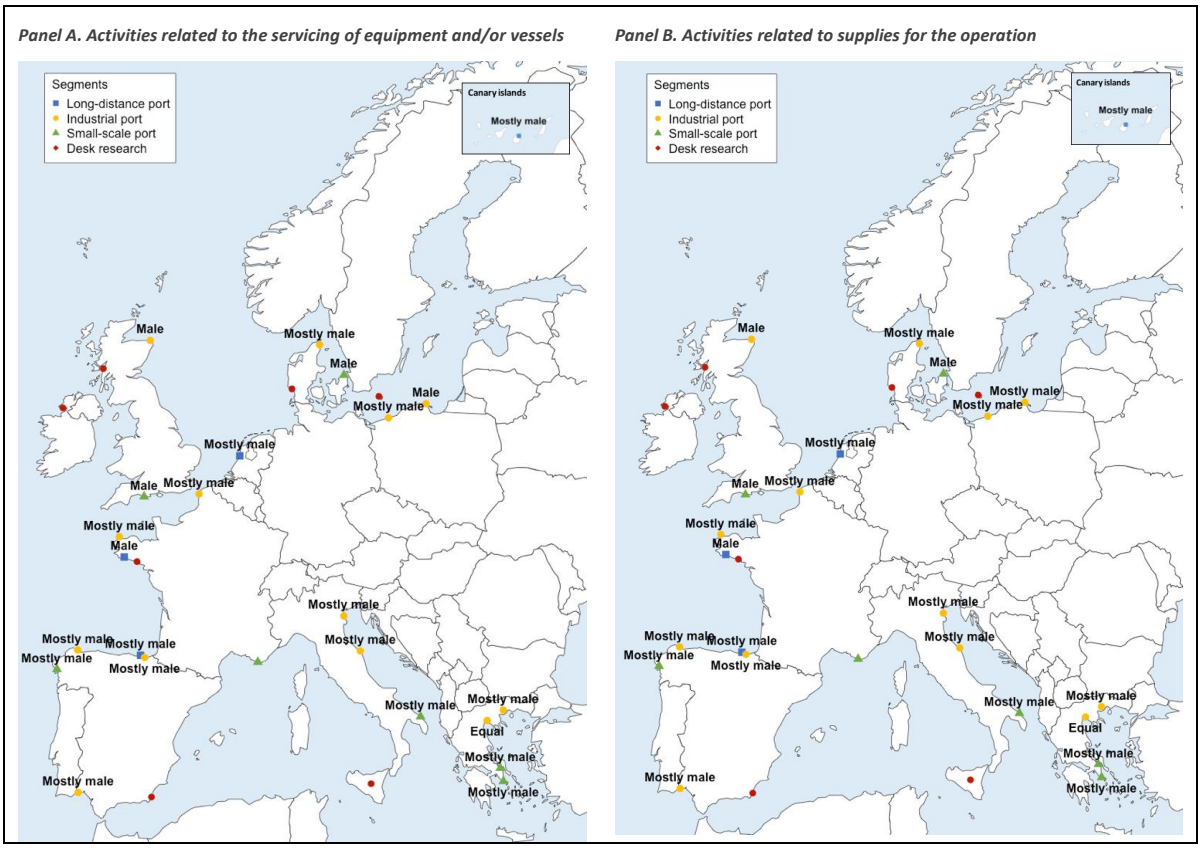
[57] Only 4 case studies provide some data on the total employment versus number of FTE.

itself. Fishermen are a lot of days at sea during the year in all kinds of weather conditions often working under heavy conditions with a lot of manual labour.

Looking at the ancillary industry, the majority of employment in this industry is still represented by male employees. This is explained by the fact that activities in the ancillary sector are still for a large deal of technical nature (e.g. activities related to the servicing of technical equipment and supplies to the operation) and, similar to fishing itself, physical in nature. Historically, these types of jobs have been filled by male employees, where several industry experts explain that nowadays some females seem to be active in the industry, albeit very sparsely.

What must be noted is that the less 'technical jobs' are also being filled by females and the gender distribution becomes more equal in these services; for instance in R+D+I services and activities related to the sale of fish (e.g. packing, sales, sorting, et cetera) (see Figure 26 and Figure 27 for a detailed overview of the gender distribution found during the case studies). In the processing of the fish – although not in scope of this study – the involvement of females is even more significant and often more than 60%.

Interesting to mention is that female involvement in marine fishing industry – the primary- and the ancillary sector – is often due to the involvement of other family members. Meaning, the wives of fishermen often also perform (ancillary) activities in marine fishing. One example was found in case of net mending in Spain, where mainly women are employed of which their husband is an active fishermen.



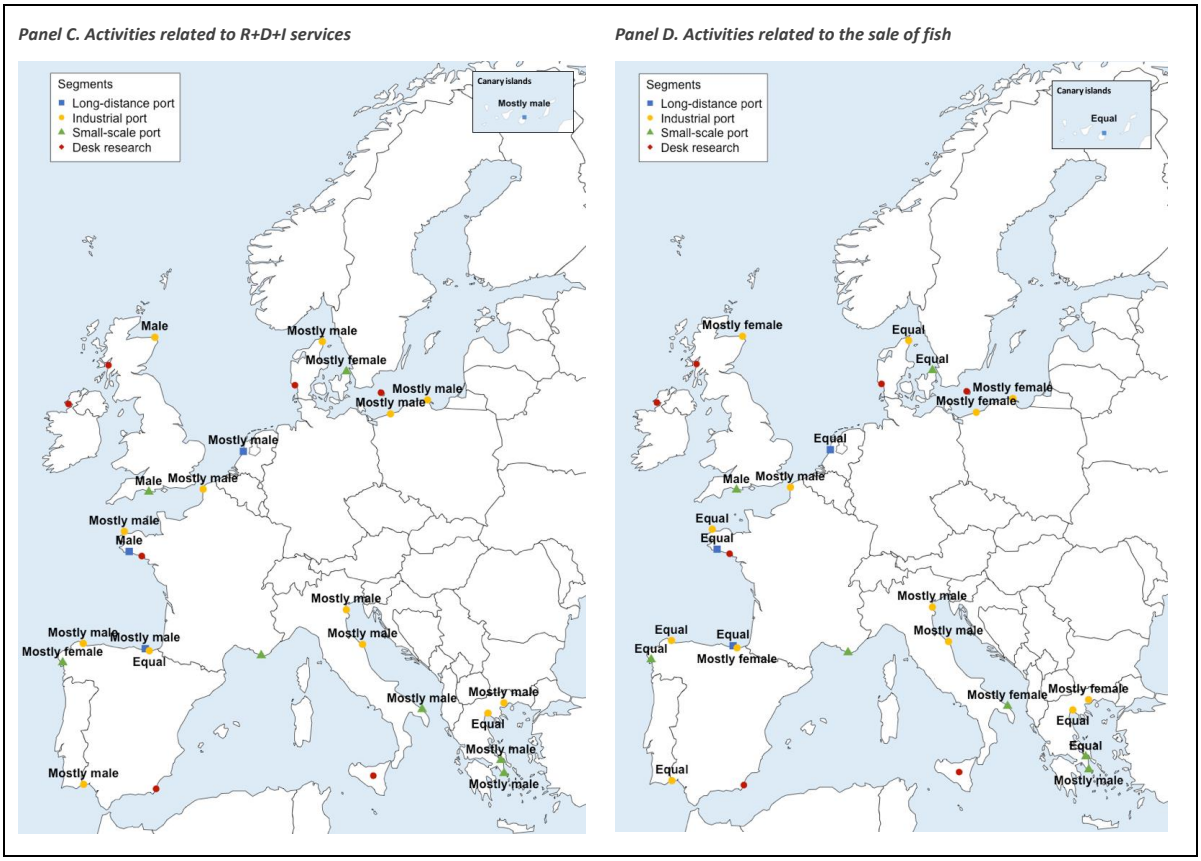
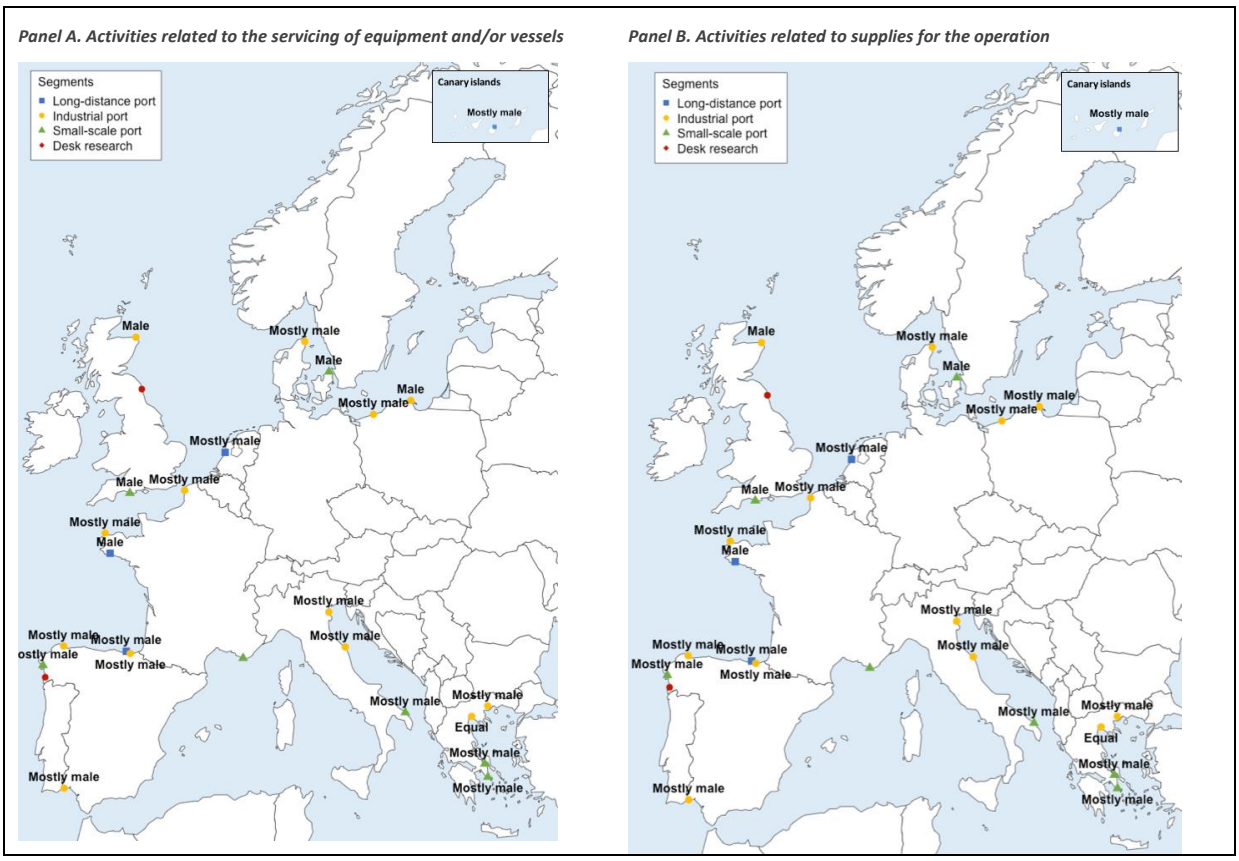


Figure 26. Gender distribution in the sector ancillary to marine fishing in 2009 (source: Case studies)



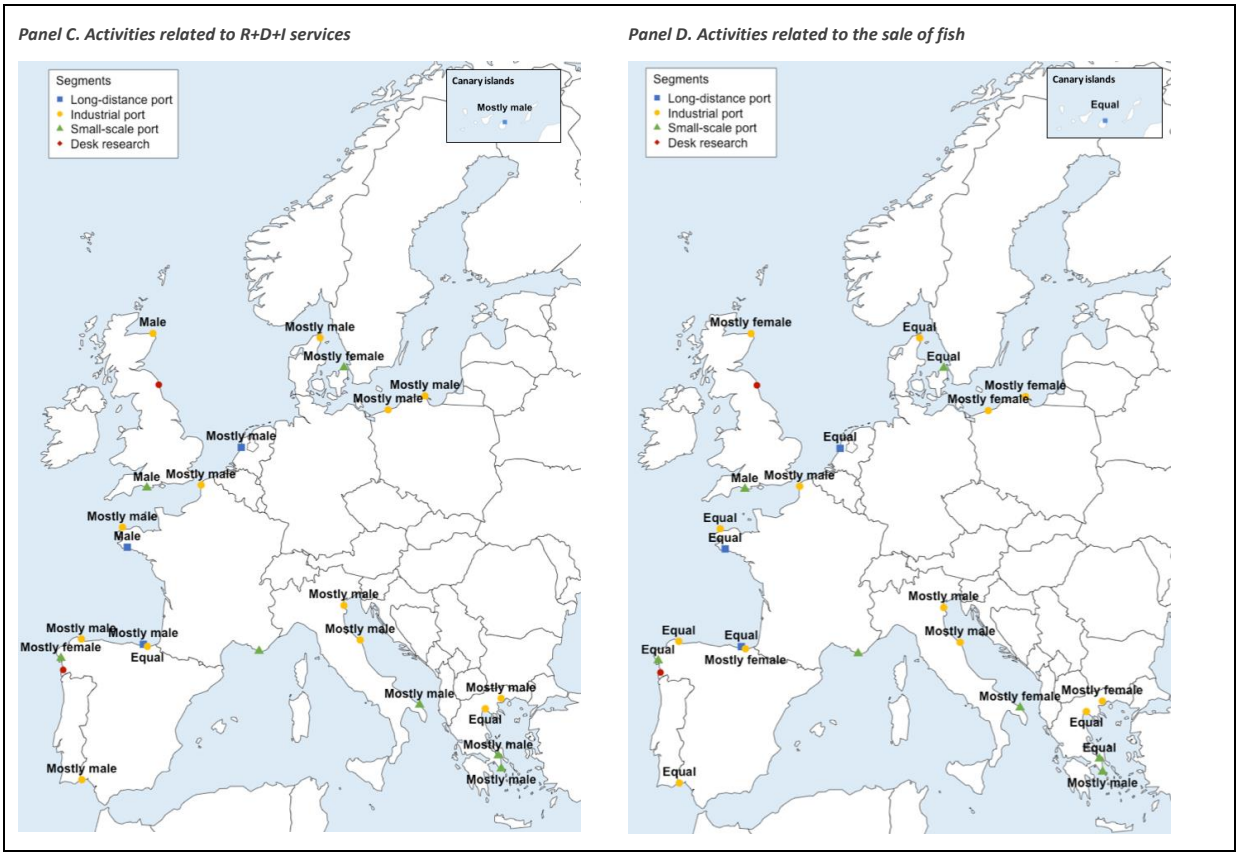


Figure 27. Gender distribution in the sector ancillary to marine fishing in 2014 (source: Case studies)

3.2.6 Socio economic data on unpaid versus paid labour

It is difficult to provide an estimation of paid and unpaid labour in the industry ancillary to marine fishing, based on findings from the case studies. What can be said is that especially in small local communities with mostly small-scale fishing activity, ancillary companies are often family-owned with active participation of family members (for instance companies active in netting, baiting, vessel maintenance, packaging, sorting, et cetera). In these communities unpaid labour is more of a factor, since family-members often help out during busy periods. For the larger ports with more industrial and long-distance vessels, unpaid labour is found to a lesser extent, since ancillary companies are often part of larger corporations and are more professionally organised. Moreover, industrial fishing and long-distance fishing require services that are more capital intensive, where capital intensive industries mostly deal with paid labour. In general, capital intensive industries are mostly found in Northern Europe, where less capital intensive industry are most often found in Southern- and Eastern European countries, since labour is generally cheaper in these countries. Hence, any unpaid labour in the ancillary industry will most likely be found primarily in Southern- and Eastern Europe.

Overall, considering the size of small-scale fishing in the European Union, significant unpaid employment is expected in especially the Southern- and Eastern European countries. Unfortunately, no exact data can be provided to substantiate these findings further.

3.2.7 Socio economic data on foreign versus national labour

To provide statistical data or a percentage distribution of foreign versus national labour in the industry ancillary to marine fishing is not possible based on case study data. Nevertheless, from the desk research and the case studies it became clear that almost all people employed in the ancillary industry are local natives. This is contrary to findings in the primary sector, where foreign involvement can be quite significant. For instance in Spain, the United Kingdom and Greece, the primary sector employs a lot of foreign people (for instance, during the case studies in marine fishing in Greece, about 50% of the people employed in the primary sector was found to be of Egyptian nationality).

One reason for increased foreign involvement in the primary sector is that due to the economic crisis a lot of natives left the primary industry and started working in other sectors. After the economic crisis these people

however did not return and skippers and vessel owners were forced to hire foreigners to fill the shortage in employment (for instance in Spain). Another reason, and perhaps the most important one, is related to the lower wages that foreigners are willing to accept. In the past few years, fishermen have been increasingly forced to cut costs – especially considering the decreasing fishing opportunities and increasing fuel prices between 2009 and 2014[58] – and therefore hired foreigners as a source of cheaper labour.

Interestingly enough, in Greece, the number of foreigners in the primary industry is decreasing since the economic crisis. The economic crisis has caused a lot of people to lose their job in Greece. As a result, natives are willing to accept lower wages compared to before the crisis and the gap in wages between foreigners and natives has converged. This has not been observed in other Member States.

Overall, these trends observed in the primary sector do not seem to apply to the ancillary sector. Foreign employment is only used to a limited extent, which is partly explained by the fact that in Southern Europe (the region where foreign employment is most often found), ancillary companies are mostly family-owned businesses. During economic downturn, the gap between foreign and local employment is not as large as in the primary sector, since family members – whom are often employed in family-owned businesses – are often prepared to accept a lower wage in economic difficult times. Another factor is that employment in the ancillary industry mostly involves the more technological-oriented jobs requiring knowledge and training in the sector. These types of jobs are generally not filled by foreigners.

3.2.8 Socio economic data on age of workforce

Unfortunately, based on the case study results it is not possible to include statistical data on the age of the workforce. However, in general what is found is that marine fishing – including its ancillary sector – is dealing with some reluctance from younger people in joining the industry. Young people feel that the industry does not have enough status and therefore rather join other kinds of industries (this is for instance found during the case study in Strandby in Denmark). What is more, the marine fishing industry has been quite volatile in some Member States in the past few years, where younger people looked for 'safer' forms of employment in other sectors. This is increasingly the case for the primary industry and to a lesser extent in the ancillary industry.

A change in the coming years is however expected. Aside from the fact that some local communities, such as the local community of Strandby in Denmark, have started programmes to increase the number of young people in the (primary) industry, the ancillary industry is also changing in itself. Marine fishing is increasingly becoming more technology-dependent and is requesting ancillary services that require higher forms of education (e.g. university) and deeper knowledge of (new) technology. This is especially the case in industrial fishing and long-distance fishing, which are, given the scale of their operation, more technology-dependent by definition. Local experts feel that this development might have a positive impact on the age in the ancillary industry and the involvement of young people in general.

3.3 Income in the ancillary industry

Similar to ancillary employment, income in the ancillary industry is also estimated on several levels; for each segment (e.g. small-scale fleet, industrial fleet, and long-distance fleet), for each subsector (e.g. supplies for the operation, R+D+I services, et cetera), for each Member State, and for the European Union as a whole. In addition, ancillary income collected from the case studies is also presented, including data collected from the desk research, to provide a regional dimension towards income figures. In the end, ancillary income related to marine fishing is estimated for both 2009 and 2014.

As was explained in Paragraph 3.1.1 of this section, income in the ancillary sector is estimated using income multipliers that were collected from the case studies. The average income multiplier per segment multiplied by the income in the primary sector in each segment and Member State will in the end result in an estimation of ancillary income (see Figure 13 for the primary data used). Figure 28 presents the average income multipliers that were calculated based on the case studies and used in the estimation of ancillary income, including the number of multipliers collected. Unfortunately, income multipliers could not be collected from all case studies due to unavailability of income data, both related to the primary sector and related to the ancillary sector. During the case studies it was found that local and national government do not collect income data on a structural basis and this information is also not available in national and local registers. Therefore, the

[58] http://www.statista.com/statistics/262858/change-in-opec-crude-oil-prices-since-1960/

estimates on ancillary income that are provided in this section were only based on a relatively limited number of income multipliers collected from the case studies.[59]

The multiplication of primary income in each segment with the multipliers presented in Figure 28 results in estimations of income in each of the aforementioned segments, geographical dimensions and years. With respect to the subsectors, ancillary income is calculated by taking a percentage of employment in each subsector in the ancillary industry against total estimated income in the ancillary sector. This is done for each case study, where an average of all case studies per subsector is taken to end up with one percentage per subsector[60]. These percentages are presented in Figure 29[61]. Please note that ancillary income can only be calculated for the main subsectors (e.g. supplies for the operation, R+D+I services, et cetera) and cannot be further specified due to unavailability of data related to income in the primary and ancillary sector; i.e. too little multipliers were available to provide a reliable estimate of ancillary income in these subsectors.

Segment	Average multiplier		Number of multipliers	
	2009	2014	2009	2014
Marine fishing	**0,3169**	**0,3541**	**8**	**10**
Small-scale fishing	0,2082	0,3807	3	4
Industrial fishing	0,4810	0,4127	3	4
Long-distance fishing	0,2338	0,1837	2	2

Figure 28. Income multipliers in marine fishing, including the number of multipliers collected

Subsector	Average % (2009)	Average % (2014)
Activities related to servicing of equipment and / or vessels	41%	44%
Supplies for the operation	33%	28%
R + D + I Services	3%	3%
Activities related to the sale of fish	23%	25%

Figure 29. Subsectors in marine fishing, including percentage of total ancillary income

This remainder of this paragraph will discuss each dimension on different geographical levels separately, where first income at the level of the European Union is discussed, after which the Member State level and regional – case study level – is discussed. Furthermore, in each paragraph the different segments and subsectors are discussed. At the regional level, data collected from the desk research will also be taken into account when available and definitions match the definition of ancillary services of this study. In the end, the results are presented in tables as well as geographical maps, including a qualitative interpretation.

3.3.1 Income in the EU, including segments and subsectors

Based on the average multipliers and primary income in marine fishing, total ancillary income in the European Union is estimated as well as ancillary income per segment in marine fishing. The results of these estimations are presented in this paragraph, where figures on ancillary income are provided for marine fishing as a whole, for each segment, and for each of the subsectors described in Figure 29.

Income (in million Euros)[62,63]

[59] More multipliers would increase the overall reliability of the multipliers collected. Less multipliers increases the amount of uncertainty around the average multiplier and will – as a result – increase the confidence intervals that will be presented in the remainder of this paragraph.

[60] For instance, when 100 thousand Euros is found in netting in case study X and the total income in the ancillary sector in case study X is 10.000 thousand Euros, netting represents 10% of the income in the ancillary sector in case study X. These percentages are calculated for netting in each case study and subsequently an average percentage for netting is taken to find one percentage for netting.

[61] The division of employment over the subsectors in marine fishing will be discussed in further detail in the subsequent paragraphs in this section.

[62] Please note that small differences in the presented figures may occur, due to rounding differences.

[63] Please note that Greece is not taken into account in the figures presented. Due to the unavailability of primary data related to Greece, it was not possible to estimate ancillary income in Greece.

	2009	2014
Marine fishing	**2.777,033 (1.695,984 - 3.858,083)**	**2.544,971 (1.770,248 - 3.319,695)**
Small-scale fishing	205,898 (14,879 - 396,918)	302,764 (81,437 - 524,092)
Industrial fishing	2.365,223 (1.675,483 - 3.054,964)	1.990,806 (1.468,896 - 2.512,717)
Long-distance fishing	205,911 (5,622 - 406,201)	251,401 (219,916 - 282,886)

Figure 30. Income in the sector ancillary to marine fishing

In Figure 30, total estimated ancillary income is presented as well as 90% confidence intervals of these estimations. As explained before, using the confidence intervals, it can be said that there is a 90% probability that the income falls within the presented intervals. In other words, the smaller the 90% confidence interval is, the more reliable the total estimated income is that is presented.

Overall, the sector ancillary to marine fishing is estimated to generate about 2.780 million Euros in 2009 and 2.550 million Euros in 2014[64]. Although this seems like a small decrease in overall income, looking at the confidence intervals, this increase is not statistically significant[65]. In other words, there is too much uncertainty to conclude that income has decreased in the sector ancillary to marine fishing (both in 2009 and 2014, the ancillary sector is estimated to generate between ~1.700 and ~3.900 million Euros). Looking at the segments, industrial fishing – in absolute terms – generates the majority of income in the ancillary sector with around 2.4 billion Euros in 2009 and 2.0 billion Euros in 2014 and is also significantly larger than the other segments in terms of income. Small-scale fishing and long-distance fishing generate between 200 million and 300 million Euros in income in 2009 and 2014. Please note that, in general, the confidence intervals presented are quite large, due to the relatively low number of income multipliers collected and used in the extrapolation of data, contributing to a relatively large amount of uncertainty around the income figures presented in Figure 30. To explain the differences between sectors, it is important to take into account the number of FTE found in the ancillary sector. This is due to the fact that absolute differences in ancillary income could be explained by differences in the number of FTE employed in this sector. While income in absolute terms provides valuable insight into the expected size of the sector, it does not provide insight in whether differences exist between segments in the value of the services provided; i.e. the income generated per FTE. The income generated per FTE in marine fishing is presented in Figure 31 and what is found is that marine fishing as a whole, generated between 70 thousand and 80 thousand Euros per FTE.

Looking at the type of services provided in the sector ancillary to marine fishing (see Figure 32 for a detailed overview of the income generated in the subsectors), ancillary services in marine fishing mostly concern activities related to the servicing of equipment and/or vessels and supplies for the operation. These activities are more specialised looking at industrial fishing and long-distance fishing compared to small-scale fishing, due to the higher degree of technology that is used in these types of fishing. By definition, specialised services generate more value – income per FTE – than less specialised services.

Segment	Income per FTE (in million Euros)	
	2009	2014
Total	**0,080**	**0,070**

Figure 31. Income per FTE in the sector ancillary to marine fishing

[64] Please note that overall figures are underestimated due to the fact that no income for Greece could be estimated because of missing data related to primary income in marine fishing.

[65] Increases or decreases are statistically not significant when confidence between two estimated values overlap.

Subsector	Income (in million Euros)	
	2009	2014
Total	**2.777**	**2.545**
Activities related to servicing of equipment and / or vessels	1.137	1.123
Supplies for the operation	931	713
R + D + I Services	70	75
Activities related to the sale of fish	639	633

Figure 32. Income in subsectors in the sector ancillary to marine fishing

3.3.2 Income in Member States, including segments and subsectors

Using the same method used for the estimation of ancillary income at the level of the European Union, ancillary income can also be estimated for each Member State, of which the results are presented in Figure 33 – including 90% confidence intervals – and in a geographical map in Figure 34.

Member State	Income (in million Euros)	
	2009	2014
Austria	N/A (-)	N/A (-)
Belgium	34,344 (24,329 - 44,36)	33,391 (24,637 - 42,145)
Bulgaria	1,177 (0,728 - 1,626)	1,730 (1,027 - 2,433)
Croatia	9,388 (6,109 - 12,667)	35,396 (24,583 - 46,208)
Cyprus	2,880 (1,126 - 4,633)	2,658 (1,316 - 4,000)
Czech Republic	N/A (-)	N/A (-)
Denmark	142,231 (97,483 - 186,98)	159,247 (113,626 - 204,868)
Estonia	7,011 (4,423 - 9,598)	5,863 (3,415 - 8,31)
Finland	10,333 (6,101 - 14,565)	19,697 (12,284 - 27,109)
France	433,054 (259,157 - 606,952)	431,232 (281,905 - 580,558)
Germany	62,020 (42,821 - 81,218)	55,172 (39,262 - 71,081)
Greece[66]	N/A (-)	N/A (-)
Hungary	N/A (-)	N/A (-)
Ireland	75,160 (52,461 - 97,859)	114,992 (83,703 - 146,280)

Member State	Income (in million Euros)	
	2009	2014
Italy	536,876 (332,18 - 741,571)	322,537 (201,771 - 443,304)
Latvia	8,825 (6,145 - 11,504)	8,156 (5,929 - 10,384)
Lithuania	10,725 (2,331 - 19,118)	18,814 (16,099 - 21,528)
Luxemburg	N/A (-)	N/A (-)
Malta	3,825 (2,418 - 5,232)	6,212 (3,780 - 8,644)
Netherlands	174,889 (123,464 - 226,313)	151,327 (111,28 - 191,374)
Poland	17,091 (10,69 - 23,492)	19,253 (12,242 - 26,263)
Portugal	155,515 (95,390 - 215,640)	120,021 (78,342 - 161,701)
Romania	0,173 (-)	0,993 (0,519 - 1,468)
Slovakia	N/A (-)	N/A (-)
Slovenia	1,018 (0,655 - 1,381)	0,555 (0,285 - 0,826)
Spain	669,067 (352,613 - 985,521)	583,851 (442,934 - 724,768)
Sweden	46,830 (31,412 - 62,248)	45,455 (31,307 - 59,603)
United Kingdom	374,603 (243,904 - 505,301)	408,420 (280,000 - 536,841)

Figure 33. Income in the sector ancillary to marine fishing per Member State

[66] Please note that income for Greece could not be estimated due to unavailability of primary data related to marine fishing in Greece.

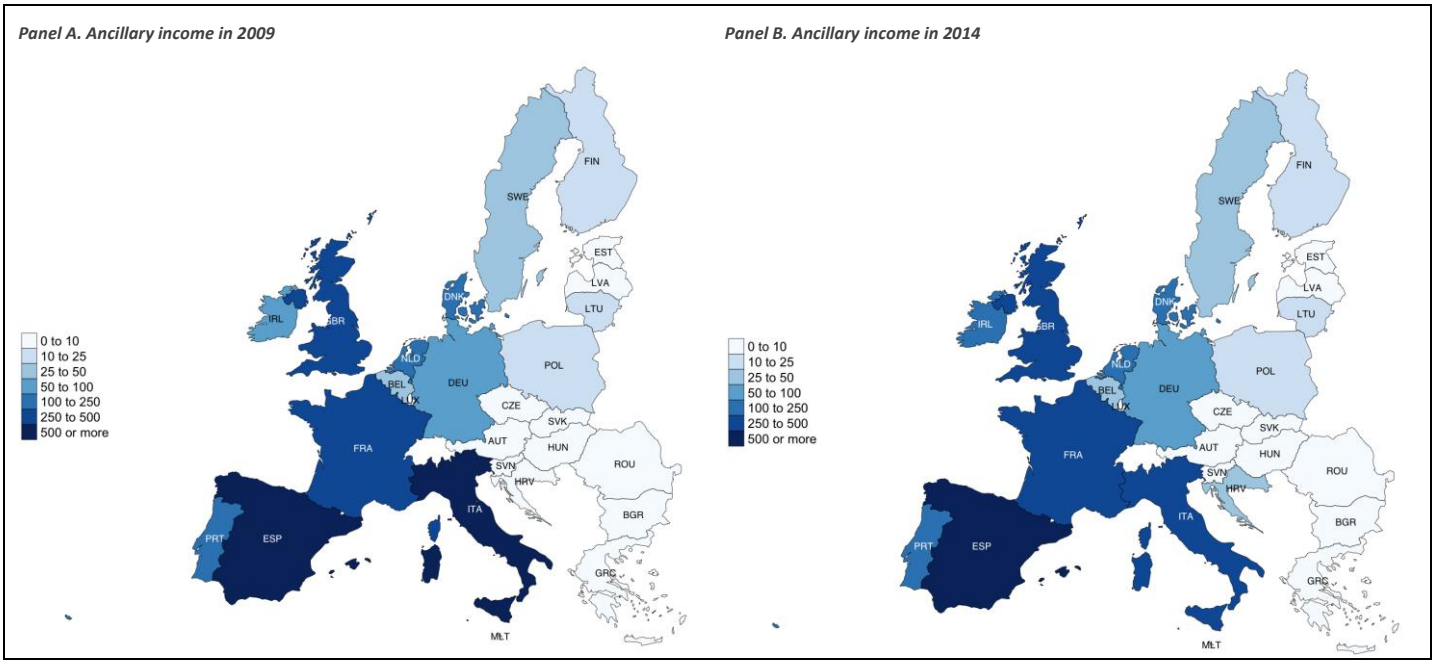


Figure 34. Geographical map of ancillary income in marine fishing

In line with the results found looking at ancillary employment, Italy and Spain generate a large deal of total income in the ancillary sector. Please note that income data on Greece is not available due to the absence of primary income data on Greece. Based on the employment levels in both the primary and the ancillary sector in Greece, Greece will most likely also be among the biggest Member States looking at income generated in the ancillary sector. Other large countries are the United Kingdom and France. Taking into account the confidence intervals presented, Spain, Italy, United Kingdom and France can also be assumed larger – with statistical significance – than all other Member States. Unfortunately, no conclusive evidence exists on differences between these Member States.

What is interesting to note is that while Portugal is amongst the largest Member States in terms of ancillary employment, it is ranked much lower looking at ancillary income. This is mainly caused by the fact that the income generated per FTE in the primary sector is relatively low compared to other Member States. For France this is the other way around, where it seems to generate relatively more income per FTE compared to other countries with the same level of employment in the ancillary sector. This – higher levels of income generated per FTE employed – in general seems to be the case for the northern European countries. In Northern Europe income generated per FTE is above 100 thousand Euros, where in Eastern- and Southern Europe this is below 100 thousand Euros per FTE employed. What must be noted is that this in general is the case when comparing economies throughout Europe, where the GDP per head of population in Eastern- and Southern European countries is lower compared to Northern European countries[67].

Looking at differences between 2009 and 2014, what is noteworthy that in Ireland, Finland, Lithuania and Croatia ancillary income seem to have increased, where a statistical significant difference has only been found for Croatia. While these countries had a relatively stable number of employees working in the ancillary sector, income seems to have risen, mainly due to an increase in income in the primary sector. Southern Europe (e.g. Italy, Spain and Portugal) seems to have experienced a decline in ancillary income in the past years – with relatively stable employment – also due to a decline in primary income.

The division of ancillary income over the subsectors in marine fishing is presented in Figure 35 and is also presented in geographical maps in Figure 36 and Figure 37, where income is presented in million Euros. In general – in line with the results presented on an EU-level – most employment is generated in activities related to the servicing of equipment and/or vessels, where especially Spain, France and Italy significant income is generated in this subsector. When comparing income generated in subsectors in 2009 and 2014, the decrease in ancillary income – although not significant – seems to be mainly caused by a decline in income in activities

[67] https://stats.oecd.org/Index.aspx?DataSetCode=PDB_LV.

related to the supplies for the operation, where it has been been decreasing in the majority of Members States and for Southern Europe in particular for the aforementioned reason (i.e. a decline in income in the primary sector).

Member State	Total		Activities related to servicing of equipment and / or vessels		Supplies for the operation		R + D + I Services		Activities related to the sale of fish	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**2.777,030**	**2.544,824**	**1.136,592**	**1.123,316**	**931,082**	**713,423**	**69,997**	**75,261**	**639,359**	**632,824**
Austria	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	**34,344**	**33,389**	14,057	14,738	11,515	9,360	0,866	0,987	7,907	8,303
Bulgaria	**1,177**	**1,730**	0,482	0,764	0,395	0,485	0,030	0,051	0,271	0,430
Croatia	**9,388**	**35,394**	3,842	15,623	3,148	9,922	0,237	1,047	2,161	8,801
Cyprus	**2,880**	**2,658**	1,179	1,173	0,965	0,745	0,073	0,079	0,663	0,661
Czech Republic	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	**142,231**	**159,238**	58,213	70,290	47,687	44,641	3,585	4,709	32,746	39,598
Estonia	**7,011**	**5,862**	2,869	2,588	2,351	1,643	0,177	0,173	1,614	1,458
Finland	**10,333**	**19,695**	4,229	8,694	3,465	5,521	0,260	0,582	2,379	4,898
France	**433,054**	**431,207**	177,242	190,340	145,194	120,886	10,915	12,753	99,703	107,229
Germany	**62,020**	**55,169**	25,384	24,352	20,794	15,466	1,563	1,632	14,279	13,719
Greece	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hungary	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	**75,160**	**114,985**	30,762	50,756	25,200	32,235	1,894	3,401	17,304	28,593
Italy	**536,875**	**322,518**	219,734	142,364	180,003	90,416	13,532	9,538	123,605	80,201
Latvia	**8,825**	**8,156**	3,612	3,600	2,959	2,286	0,222	0,241	2,032	2,028
Lithuania	**10,725**	**18,813**	4,390	8,304	3,596	5,274	0,270	0,556	2,469	4,678
Luxemburg	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**3,825**	**6,212**	1,566	2,742	1,282	1,741	0,096	0,184	0,881	1,545
Netherlands	**174,889**	**151,318**	71,579	66,794	58,637	42,421	4,408	4,475	40,265	37,628
Poland	**17,091**	**19,251**	6,995	8,498	5,730	5,397	0,431	0,569	3,935	4,787
Portugal	**155,515**	**120,015**	63,650	52,976	52,141	33,645	3,920	3,549	35,804	29,844
Romania	**0,173**	**0,993**	0,071	0,438	0,058	0,278	0,004	0,029	0,040	0,247
Slovakia	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	**1,018**	**0,555**	0,417	0,245	0,341	0,156	0,026	0,016	0,234	0,138
Spain	**669,066**	**583,817**	273,838	257,704	224,324	163,669	16,864	17,266	154,040	145,178
Sweden	**46,830**	**45,452**	19,167	20,063	15,701	12,742	1,180	1,344	10,782	11,303
United Kingdom	**374,602**	**408,397**	153,318	180,271	125,597	114,491	9,442	12,078	86,245	101,556

Figure 35. Income per subsector in the sector ancillary to marine fishing

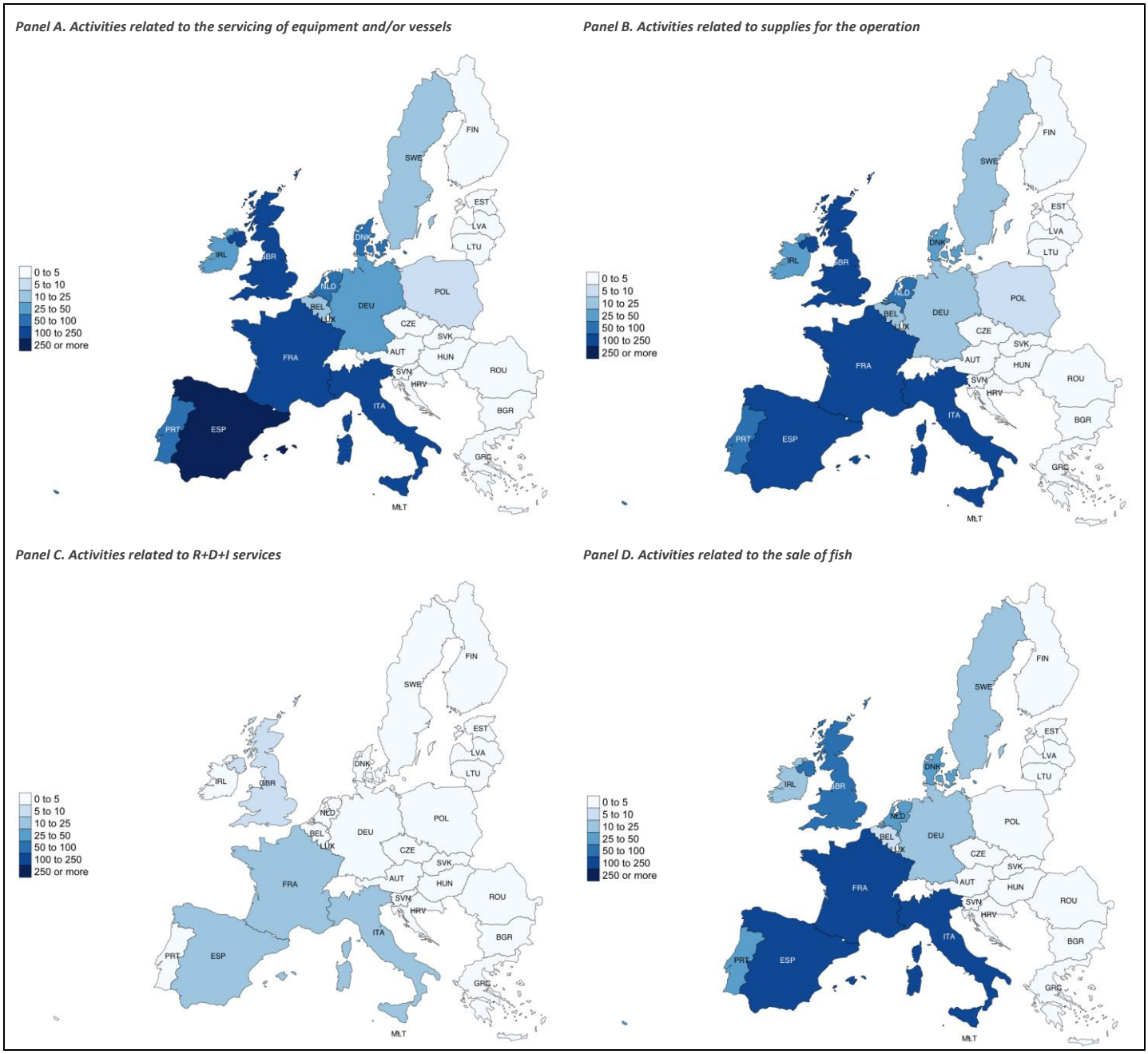


Figure 36. Income per subsector in the sector ancillary to marine fishing in 2009

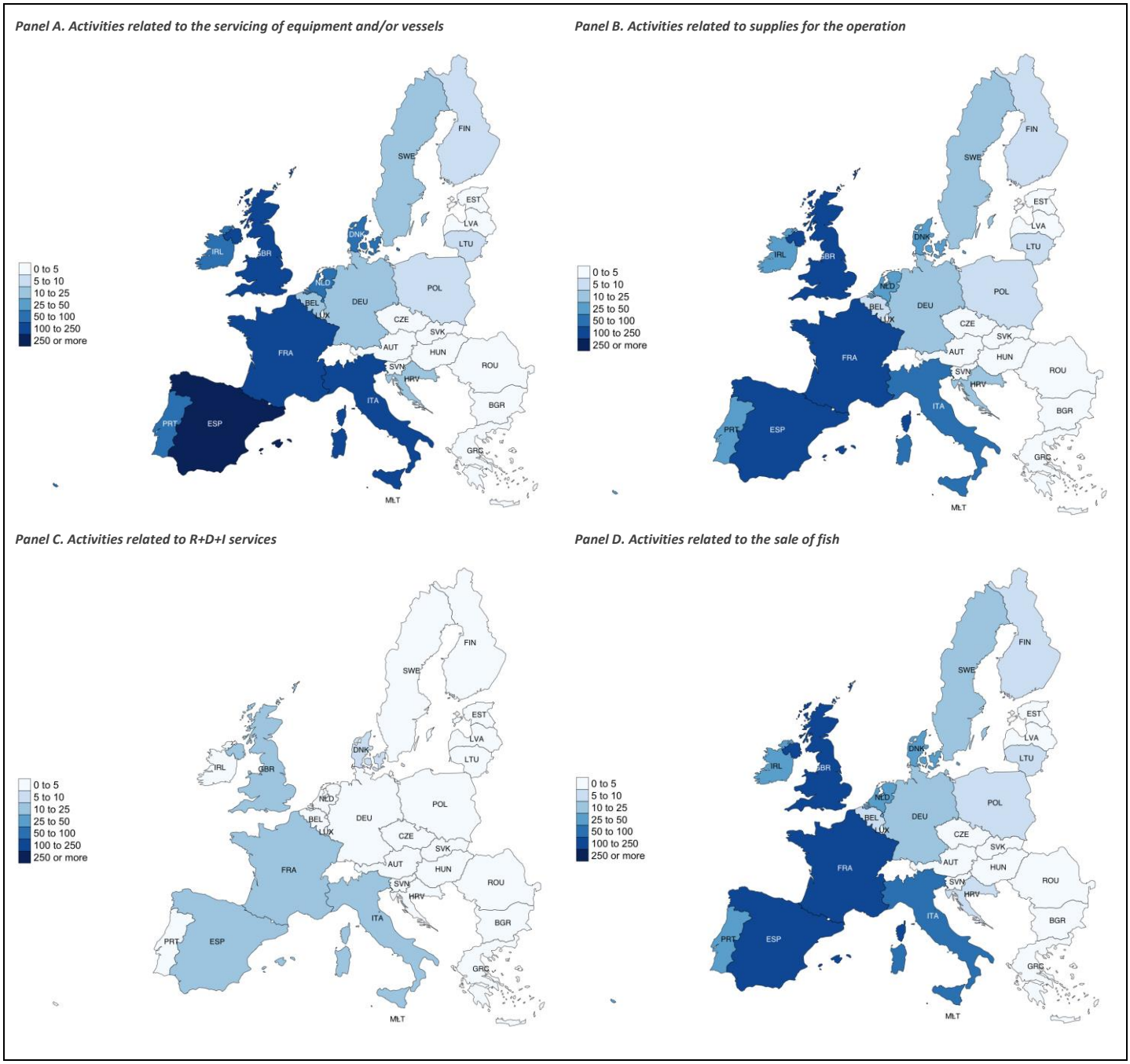


Figure 37. Income per subsector in the sector ancillary to marine fishing in 2014

3.3.3 Regional overview and contribution to local economies

As was explained before, the estimates related to income generated in the sector ancillary to marine fishing on the level of the European Union as well as on a Member State level, were based on case studies performed throughout the European Union. In this paragraph, a regional overview of income data and income multipliers are presented in both table-form (Figure 38) and geographical maps (Figure 39 and Figure 40), where data is further complemented with usable findings from the desk research performed in this study [68]. In addition, in Figure 38, the data is also divided over each sea basin to also outline possible differences between the different sea basins in Europe.

[68] Please note that data from the desk research was only used when the definition was in line with the definition used in this study.

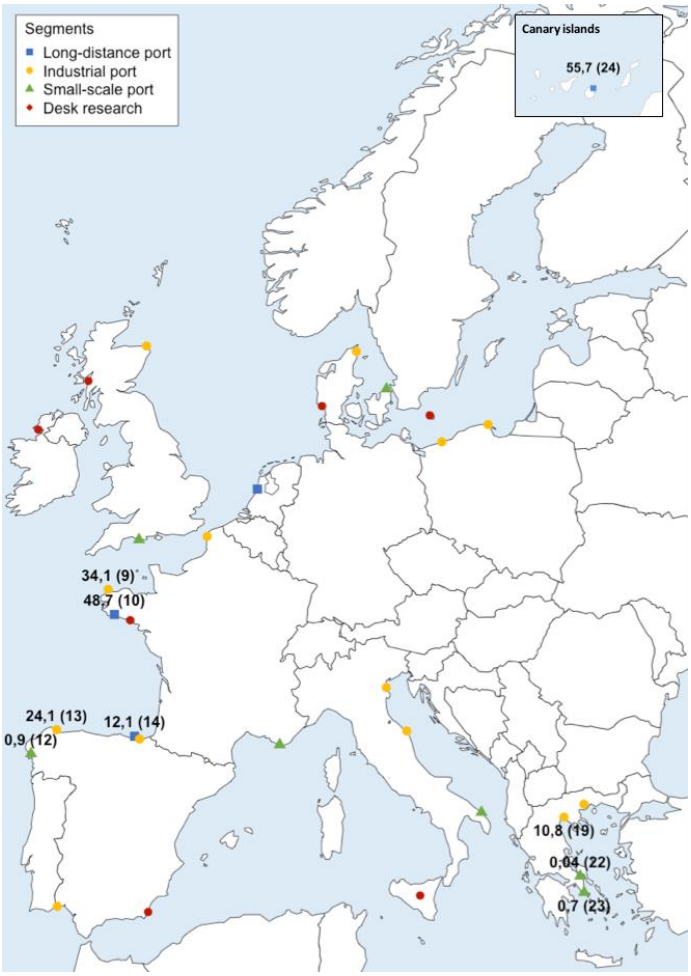
In the geographical maps each point represents a case study or data collected from the desk research, where from the desk research, only multipliers could be collected. Hence, only in the geographical maps on income multipliers – Figure 40 – data related to the desk research is presented[69].

Country	Port	Segment	Ancillary income		Income multiplier	
			2009	2014	2009	2014
North Atlantic Ocean						
France	Boulogne	Industrial port		23,200		0,55
France	Concarneau	Long-distance port	48,700	33,800	0,43	0,20
France	Guilvinec	Industrial port	34,100	33,700	0,65	0,53
Ireland	Killybegs	Desk research			0,46	
Spain	Carboneras	Desk research			0,28	
Mediterranean Sea						
France	Hyeres	Small-scale port		1,800		0,89
Greece	Lavrio	Small-scale port	0,700	0,500	0,49	0,47
Greece	Mihaniona	Industrial port	10,800	9,200	0,29	0,23
Greece	Oropos	Small-scale port	0,040	0,020	0,02	0,05
Spain	Bermeo	Long-distance port	12,100	12,400		
Spain	Burela	Industrial port	24,100	23,300	0,50	0,35
Spain	Las Palmas	Long-distance port	55,700	60,700	0,04	0,16
Spain	Noia	Small-scale port	0,900	0,800	0,11	0,11

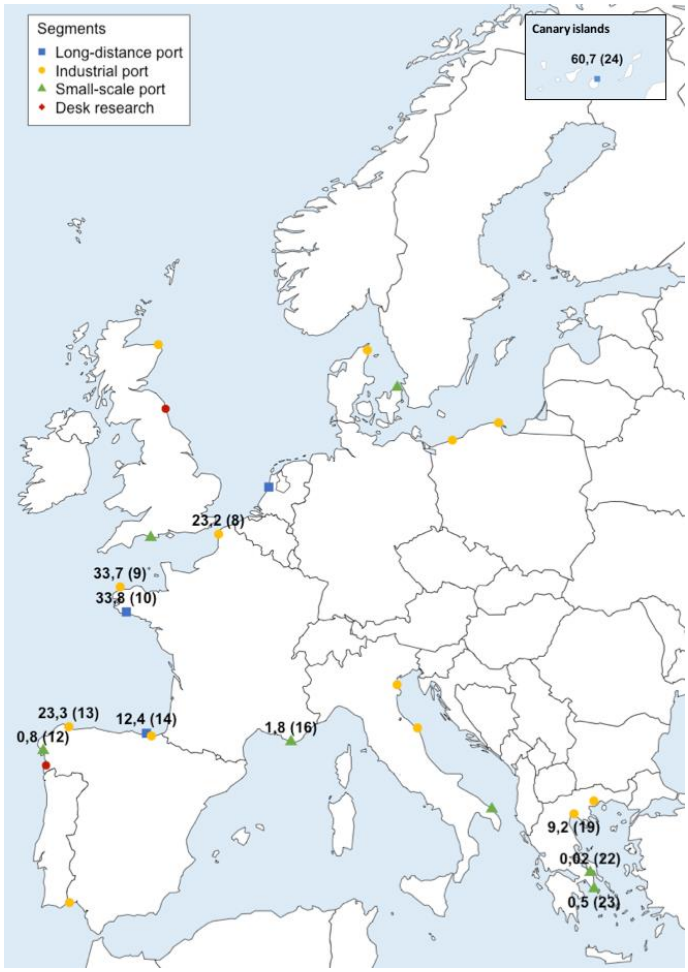
Figure 38. Regional analysis – Income

[69] Please note that a port in the geographical map that is presented without data, means that no data on either income or income multipliers could be collected related to this port.

Panel A. Ancillary income in 2009



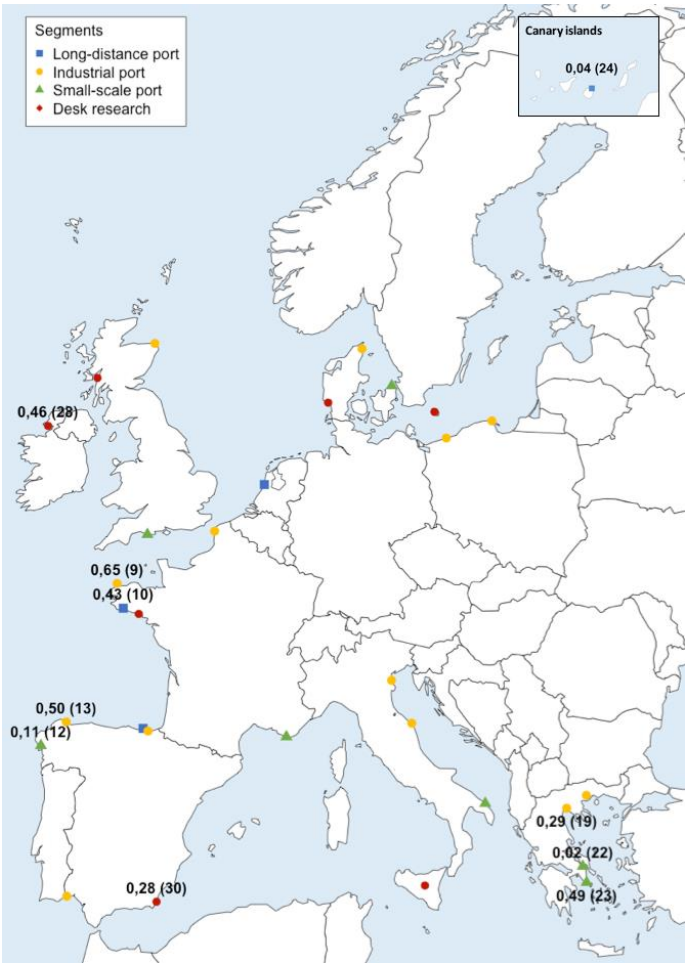
Panel B. Ancillary income in 2014



(1)Fraserburgh, United Kingdom (2) Strandby, Denmark (3) Gilleje, Denmark (4) Wladyslawowo, Poland (5) Kolobrzeg, Poland (6) IJmuiden, Netherlands (7) Weymouth, United Kingdom (8) Boulogne, France (9) Guilvinec, France (10) Concarneau, France (11) Chioggia, Italy (12) Noia, Spain (13) Burela, Spain (14) Bermeo, Spain (15) Ondarroa, Spain (16) Hyeres, France (17) Brindisi, Italy (18) Ancona, Italy (19) Mihaniona, Greece (20) Kavala, Greece (21) Isla Cristina, Spain (22) Oropos, Greece (23) Lavrio, Greece (24) Las Palmas, Spain (25) Oban, United Kingdom (26) Bornholm, Denmark (27) Esbjerg, Denmark (28) Killybegs, Ireland (29) Auray, France (30) Carbonera, Spain (31) Sicily, Italy

Figure 39. Regional overview of income in activities ancillary to marine fishing (source: Desk research & Case studies)

Panel A. Ancillary income multipliers in 2009



Panel B. Ancillary income multipliers in 2014

(1)Fraserburgh, United Kingdom (2) Strandby, Denmark (3) Gilleje, Denmark (4) Wladyslawowo, Poland (5) Kolobrzeg, Poland (6) IJmuiden, Netherlands (7) Weymouth, United Kingdom (8) Boulogne, France (9) Guilvinec, France (10) Concarneau, France (11) Chioggia, Italy (12) Noia, Spain (13) Burela, Spain (14) Bermeo, Spain (15) Ondarroa, Spain (16) Hyeres, France (17) Brindisi, Italy (18) Ancona, Italy (19) Mihaniona, Greece (20) Kavala, Greece (21) Isla Cristina, Spain (22) Oropos, Greece (23) Lavrio, Greece (24) Las Palmas, Spain (25) Oban, United Kingdom (26) Bornholm, Denmark (27) Esbjerg, Denmark (28) Killybegs, Ireland (29) Auray, France (30) Carbonera, Spain (31) Sicily, Italy

Figure 40. Regional overview of income multipliers in activities ancillary to marine fishing (source: Desk research & Case studies)

In Figure 39, the estimated ancillary income is presented in a geographical map. In terms of interpretation, when looking for instance at Guilvinec in France, 34,1 million Euros (33,7 million Euros) was generated in the sector ancillary to marine fishing in 2009 (2014). With respect to Figure 40, each point on the geographical map represents an income multiplier. Hence, when looking for instance at Noia in Spain, an income multiplier of 0,11 (0,11) was found in 2009 (2014). Meaning, for each Euro generated in the primary sector, the sector ancillary to marine fishing within the Noia port was estimated to generate 0,11 Euro (0,11 Euro) in 2009 (2014).

What stands out from the data is that a relatively low number of income figures and income multipliers were collected from the case studies and desk research. This is mainly caused by the fact that income data – both on the primary and the ancillary sector – is largely unavailable. Local and national governmental organisations were consulted as well as local and national registers, but neither seems to collect income data on a structural basis[70]. What is more, in contacting individual companies it was found that companies often are reluctant to share income data. Nevertheless, some multipliers could be collected and enough to form a baseline of income multipliers for the extrapolation of data. Looking at the multipliers presented in Figure 38 and Figure 40, what is found is that it is very difficult to conclude whether differences between the different segment as multipliers seem to differ significantly; e.g. in small-scale fishing multipliers of 0,02 have been found as well as multipliers

[70] The information companies have to declare to governments and local registers is often limited and they are often not obligated to share financial information.

of 0,89. It is therefore not possible to determine whether segments and Member States are different from each other looking at the amount of income generated per Euro generated in the primary sector. Overall, on average, the income multipliers seems to be between 0,2 and 0,4. In other words, per Euro generated in the primary sector, between 0,2 and 0,4 Euro is generated in the sector ancillary to marine fishing.

3.3.4 Estimates of profits in the ancillary sector

Profits are a very sensitive subject for companies active in the ancillary industry as they feel it might compromise their position in the market with respect to their competitors. This type of information is also not collected by the national and/or local government and companies are often not obligated to report on profits to the national and local registers (especially smaller companies Member States do not seem to have the obligation to report this kind of data). Therefore, it has been proven very difficult to collect exact data on profits.

Even though no exact data on profits could be collected, the type of services delivered and maturity of the industry in general are factors that influence the profitability of a sector and can thus be taken into account in estimating profit in the ancillary sector. In this estimation, a clear distinction can be made between specialised and non-specialised services. Specialised services (e.g. servicing of equipment and vessels) are those services that require deeper knowledge of the industry and are harder to copy by other companies; i.e. scarcer. Non-specialised services (transport, storage, food for the crew, fuel, et cetera) are often commodities that are offered on a large scale by a lot of companies, regionally, nationally and internationally. In general, companies providing specialised services have higher profit rates than companies offering non-specialised services.

There are also those services that require higher forms of education, such as accounting, management, research, training, et cetera. Services that require higher forms of education are scarcer by definition and thus profit rates tend to be higher.

In summary, looking at all the ancillary subsectors identified in marine fishing, higher profit rates are expected in the servicing and maintenance of vessels and equipment and R+D+I services, while lower profit rates are expected in supplies for the operation and activities related to the sale of fish.

Differences between segments are also expected. In general, industrial fishing and, to a larger extent, long-distance fishing, require more specialised services compared to small-scale fishing. Small-scale vessels depend to a lesser extent on technology and are also smaller in size making it easier for companies to provide services to this segment in marine fishing. Moreover, aside from maybe the provision and maintenance of fishing nets, other required services are also not very specialised for this segment in particular (e.g. provision of ice, food for the crew, transport, et cetera). Industrial vessels and long-distance vessels however, taking into account the scale at which they operate, are far more complicated and contain a lot more technology, which are mostly provided by specialised companies; e.g. radar equipment, specialised fishing equipment, et cetera. In addition, the additional services (e.g. transport, accounting, management, bait, et cetera) they require are – given their scale – not in reach for a lot of (smaller) companies. Therefore, compared to small-scale fishing, higher profit rates are most likely found at companies providing services to the industrial vessels, and even more so to long-distance vessels.

Although this does explain something about the relative profitability of companies providing different kinds of services to different segments in marine fishing, this does not yet say anything about profitability in absolute terms. What is found is that given the development in the primary sector as well as the economic climate as a whole, making a profit has become increasingly difficult and most companies struggle with making a profit. Fishermen are still reluctant to invest, dealing with decreasing stocks and decreased access to finance (also see Example 3.1). Nevertheless, based on anecdotal evidence from the case studies, most ancillary companies seem to make a profit, albeit marginally.[71]

Example 3.1 Profits in the sector ancillary to marine fishing in Kavala, Greece

Greece suffered from the economic crisis, where it is still struggling with its economic recovery. This also had an effect of the fishing sector – the primary and the ancillary sector. Looking at the ancillary sector specifically, all activities related to the construction and servicing of equipment faced depletion of revenues (-60% to -70%)

[71] Please note that due to the unavailability of data related to profits, no estimates can be provided on the gross value added of the ancillary sector.

and profitability (-54%), which is a clear indication that the fishermen stopped investing in their business. The interviewed fishermen declared that they were forced to reduce their cost because of several factors. First of all, in 2009, the average fuel price per litter was 0,4747 Euros, while in 2014 increased to 0,6288 Euros per liter. Second, they faced a sharp increase in their personal tax and were faced with general economic uncertainty due to the financial crisis. Their reaction was to cut off expenses and postpone investments. For instance, before the crisis, they used to dry-dock to service their vessels every year. Today, they use the dry-dock only every second year or so.

3.3.5 Socio economic data on education, salaries and working experience

The ancillary industry is characterised by people with a lower education that often have a lot of working experience in the industry. In general, less than 10% has a form of higher education, where the remainder finished secondary school and received training on-the-job. Especially considering the fact that a lot of companies – mainly in Southern Europe and small-scale ports – are family-owned companies. Experience – in the primary and the ancillary sector – is often built from an early age and companies are often transferred from generation-to-generation, where family members are often engaged in the daily operation to a large extent. What must be noted is that younger people tend to have higher forms of education compared to older people, where also a number of specialised educational institutions have been established in the past decade (for instance Denmark).

An interesting trend is that the education level in general has been increasing in the ancillary industry, due to increasing demand of technology-depend services – mainly in industrial fishing and long-distance fishing. These services often require deeper knowledge of technology and technical equipment and therefore also requires higher forms of education. In addition, the scale of the operation of fishing companies in for instance long-distance fishing also requires more skills from management and other related positions.

Other types of services that require higher levels of education are those that are provided in R+D+I services, like research, training, insurance, certification, accounting, et cetera.

Looking at the salaries paid to people active in the ancillary industry, those services that require a higher level of education offer higher salaries to employees compared to jobs which require a lower level of education, where salaries are often at the lower end of the market. In short, the higher salaries are paid within the more technology-dependent services (for instance radar equipment for long distance vessels) and R+D+I services, such as accounting, insurances, certification and management.

3.4 Trends in ancillary fishing activities

This paragraph discusses the trends collected from the desk research and the case studies where special attention is paid to success stories, emergence of new activities, the resilience of the ancillary sector, innovation, and geographical differences looking at the ancillary sector throughout the European Union. Moreover, the interaction between the primary and the ancillary sector is discussed.

In general, ***the economic crisis impacted both the primary sector and the ancillary sector, slowing down investments in the primary sector as well as the ancillary sector***. Although many Member States have started to recover from the crisis, many local communities are still struggling and are confronted with lower profitability rates than before the economic crisis. Especially in Greece, uncertainty with respect to the national economy is slowing down the fishing industry and the ancillary sector.

The primary fishing sector is characterised by decreasing fishing opportunities in all Member States taken into account in this analysis. As a result, ***profitability has gone down and decommissioning plans have been developed to reduce the number of vessels in the industry, mainly trawlers***[72]. In the end, the decommissioning plans should result in a more sustainable fishing industry and prevent depletion of resources

[72] Management of fishing capacity serves the aim of a stable and enduring balance between the fishing capacity of the fleets and the fishing opportunities over time. EU countries are obliged to report annually on this balance, using the guidelines prepared by the European Commission. For fleet segments with overcapacity the Member State has to take measures under an action plan, to achieve the balance, for instance through publicly funded decommissioning of vessels. When a Member State fails to report or does not implement the action plan, this may lead to proportionate suspension or interruption of the relevant EU funding. For each EU country a fishing fleet capacity ceiling is established, in kilowatts (kW) and gross tonnage (gt). New fishing vessels may enter the fleet only after the same fleet capacity (in kW and gt) is removed from the fleet. Through this 'entry-exit' system Europe's fleet can no longer increase. Source: http://ec.europa.eu/fisheries/cfp/fishing_rules/fishing_fleet/index_en.htm.

in waters in the European Union. Although in some regions this has already resulted in increasing fishing opportunities, many local experts explain that there is still a lot to gain with respect to increasing sustainability of the industry. In other words, a further decline in the number of vessels is also expected in the near future.

Looking at the types of fleet, small-scale fishing is a more traditional activity in many countries such as Greece, Italy, Spain and France, while industrial fishing and long-distance fishing is more technology-dependent focused on efficiency and volume. ***Especially in industrial fishing, fishermen are forced to increase their efficiency due to increasing fuel prices (in the period 2009-2014[73]) and decreasing fishing opportunities***[74]. Given the traditional nature of small-scale fishing, fishermen tend to perform most ancillary activities themselves, where only specialised activities are being outsourced.

With respect to the ancillary sector, ***diversification is seen in almost all Member States, where ancillary companies have started to transfer the services they provide to other industries***. For instance, looking at services related to the maintenance of fishing vessels, shipyards have also started servicing yachts, offshore vessels, and other vessels mooring at ports. In the end, this reduces their overall dependency on the fishing industry and increases their overall resilience. Aside from diversification, ***ancillary companies are also extending their business to other regions in their Member State as well as regions in other countries***; inside and outside the European Union. While previously providing services to fishermen mooring in the region, they have started to provide services to the whole country as well as to other countries. Similar to diversification, this decreases their dependence on the local fishing industry. What must be noted is that it is not possible for all ancillary services; i.e. some services cannot be transferred to other industries (e.g. net mending) and some services cannot be provided in other regions (e.g. auctioneering). Hence, some ancillary activities will still be highly dependent on the local fishing industry in the future.

Looking at the diversification strategies applied by ancillary companies throughout the European Union, Spain is somewhat special. In Spain, ancillary providers still rely on the primary fishing industry, where local experts explain that when marine fishing would disappear, ancillary companies will most likely go out of business. Even though the primary sector in Spain also experienced a decline in production as well as employment, local experts explain that this has not resulted in the same decline in the ancillary sector, because of foreign vessels mooring at the ports in Spain. Dependence on foreign vessels – fishing and non-fishing vessels – is high and by some estimated to be higher than 75% - especially in the southern ports in Spain. It is interesting for foreign vessels to moor in Spanish ports due to favourable market conditions and the facilities offered by the ports themselves. In the end, while still being reliant on the primary fishing sector and the local port, Spanish ancillary providers are still quite resilient because of the foreign vessels mooring at the ports (see Example 3.2). This dependency of the ancillary industry on the primary fishing industry is also depicted geographically in Figure 41.

Example 3.2 Long-distance fishing at Las Palmas

Las Palmas is an important port for vessels involved in long-distance fishing, since many fishing grounds are located near the Canary Islands. Therefore, Las Palmas has developed as an important hub for catches of the long-distance fleet.

In recent years, the port of Las Palmas has experienced a significant decrease in fishing activity from vessels originating from the European Union. Main reason for this was the introduction of administrative requirements with strict landing inspections and the cancelation of fishing authorisations in the African countries (e.g. Octopus fishing along the coast of Mauritanie).

While this had a negative impact on the ancillary sector in terms of ship agents – the number of firms and income has decreased significantly – other segments such as mechanic workshops, shipyards and suppliers for the operation have not been affected as negatively as the ship agents subsector. This is mainly explained by the fact that a lot of foreign (non-EU) vessels are also mooring at the port of Las Palmas. These vessels range from fishing vessels such as trawlers and long-liners to reefers transporting containers. Vessels originate from countries such as China, Russia, Japan, and third-world countries and local experts estimate that in excess of 50% of the vessels mooring at Las Palmas originate from countries other than Spain.

[73] http://www.statista.com/statistics/262858/change-in-opec-crude-oil-prices-since-1960/

[74] Especially considering newly introduced regulation that forces them to land all bycatch, where bycatch will also be included in the quota of the species caught.

In the end, it was the existence of these foreign vessels that prevented that the negative trend in the primary sector also affected the ancillary industry in a similar negative way.

What is interesting to note is that ***tourism also plays an important role in the marine fishing industry***. While tourism is an alternative industry looking at diversification (e.g. some shipyards also started to provide services to recreational vessels and yachts), tourism is also important for the local community. ***Marine fishing often does not contribute to tourism directly, but plays a vital role in attracting tourists to the region***. For instance in France, locally caught fish is sold by restaurants and tourists visit the area to experience these local products and see how the fish is harvested and caught (see Example 3.3)[75].

Example 3.3 Marine fishing and tourism in the port of Hyeres, France

Fishery is part of the local culture and represents an ancient traditional activity in Hyeres in France, where most of the local gastronomy includes local species of fish and seafood. The fisheries sector participates and plays an important role in making the region attractive for tourism and holidays; when eating fish in the region/port, tourists expect that it is caught in this region.

In the end, local products thus contribute to the attractiveness of this region/port, where regional image and representation are inseparable from the fishing sector and its products.Overall, ancillary companies are still influenced by developments in the primary industry. In areas where the fishing industry experienced a decline, many ancillary companies still explained to have experienced a decline in their income too, albeit on a smaller scale. Therefore, while the primary fishing sector experienced a decrease in employment, this has not resulted in a decrease in employment in the ancillary sector, even though their income is put under pressure. Especially the fact that fishermen are reluctant to invest and have decreased access to finance is putting a strain on ancillary companies. Nevertheless, their diversification strategies, to a certain extent, allowed them to stabilise income and expand their business to other sectors and geographical areas. Overall, ***the dependency of ancillary companies on the primary fishing sector is still quite substantial in some local communities, but is decreasing as a whole***, because of the aforementioned reasons. In Figure 41, the dependency of the ancillary industry on the primary fishing industry is also visualised in a geographical map. In Example 3.4, 3.5 and 3.6 some success stories are also mentioned, where at first instance, developments in the primary fishing industry seem to negatively impact the ancillary industry, but turned out to increase the resilience of these companies in the long run because of their diversification strategies.

[75] The tourism industry in marine fishing will be discussed more elaborately in Chapter 5.

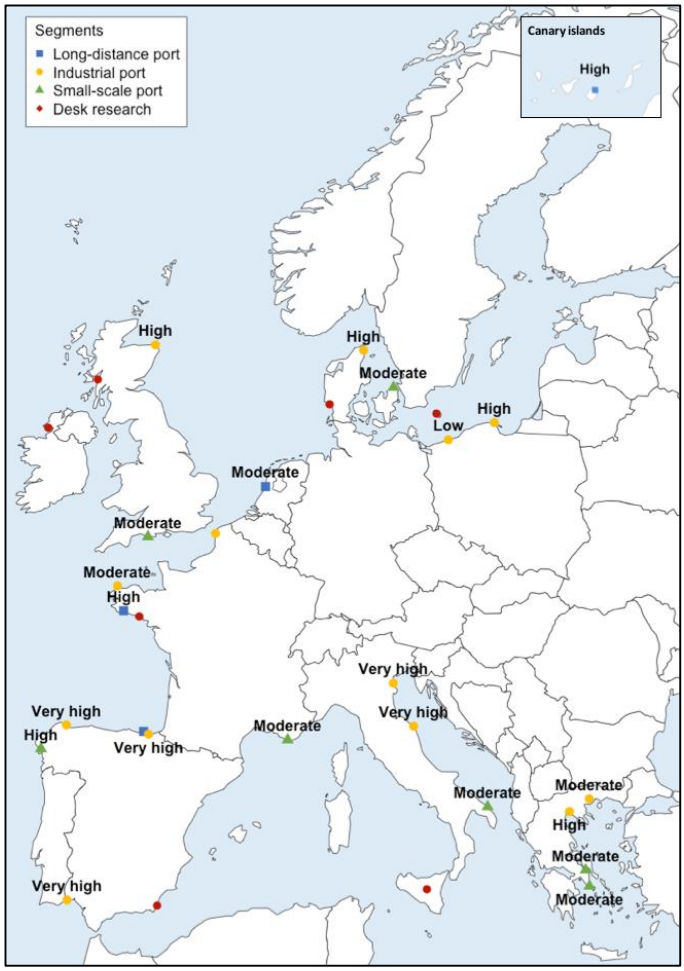


Figure 41. Dependency of the sector ancillary to marine fishing on the primary sector in marine fishing (source: Case studies)

Example 3.4 Construction and repair of ships at Astilleros Armon in Spain

Astilleros Armon is a group of several companies dedicated to the construction and repair of ships, specialised in fishing vessels, tugs, dredgers, yachts and pleasure crafts. Their headquarters is in Navia, in the Spanish autonomous community Principado de Asturias, that integrates their operations in the areas of management, administration and engineering. Apart from their premises in Navia, Astilleros Armon comprises of four more shipyards in Galicia (Burela and Vigo) and Asturias (Gijon and Puerto Vega), and another factory in Jarrio (Asturias).

While providing services to local fishermen as well as governments and private organisations for ferries, cargo vessels, yachts and pleasure crafts, Astilleros Armon recognised a new business opportunity in 2013: building large fishing vessels for international fishing companies specialised in tuna fishing with purse seines and freezing facilities. Despite the economic crisis this 'new' market allowed them to expand their business to America (e.g. Mexico, Panama et cetera) and Africa (e.g. South Africa, Seychelles, et cetera). Currently, Astilleros Armon is even the market leader in shipbuilding related to tuna fishing in America and Europe. Of the vessels built, about 85% is exported to other countries, both within Europe and the rest of the world.

In the end, globalisation ensured a stable form of income and allowed them to expand their business, even in time of local economic downturn, reducing the dependency of a specific region or segment of shipbuilding.

Example 3.5 Marine fishing in the port of Strandby in Denmark

Strandby has historically been a fishing area with a lot of marine fishing activity. While the port grew significantly, after the introduction of the Common Fisheries Policy, growth was put to a halt in the late 1970s through the introduction of fish quota. In the subsequent years, due to a decrease in fishing

opportunities, fish quota were further reduced, decreasing incomes of fishermen and profitability of the industry as a whole. The economic crisis has also further slowed down investments in the primary industry, forcing fishermen to use relatively old vessels.

Especially the absence of investments has significantly impacted the ancillary industry and income generated from the primary fishing industry has been stagnating for the ancillary industry. This, combined with the fact that the fishing industry in Denmark is declining in general, caused many ancillary companies to diversify to other sectors. While dependency on the primary fishing sector was previously high and estimated on being larger than 80%, today, due to diversification strategies, many companies only rely for 25% or less on the fishing industry. Meaning, ancillary companies were successful in expanding their business to other sectors . For instance, one net making facility was also found providing services related to the creation of playgrounds. Furthermore, some shipyards also started providing services to recreational yachts.

In the end, these diversification strategies allowed ancillary companies – with stagnating income from the primary fishing industry – to be more resilient with respect to the primary fishing industry, create a stable source of income and even expand their business to other sectors and countries.

Example 3.6 Marine fishing in France

In France, case studies have been performed in each of the segments identified in marine fishing; e.g. small-scale fishing, industrial fishing and long-distance fishing. What is found is that all of the ports visited, experienced a decline in fishing activity in the past few years. The decline was mainly caused by the fact that fishing opportunities are under pressure and quota have been decreasing year-upon-year. In France, many trawlers were decommissioned using decommissioning programs, and fishing companies reverted to richer fishing areas outside the European Union, in for instance the Indian Ocean[76], to make up for the decline in fishing activity in France.

The ancillary sector was also impacted by the decrease in fishing activity in France. Local experts explain that almost all companies experienced decreasing demand from the fishing industry related to the services they provide. In the past few years, the ancillary sector has therefore invested significantly in diversification and in expanding their services to other regions in France and the EU. For instance, many companies whom previously exclusively provided services to the fishing industry, transferred their services also to the oil and gas industry and several land-based industries. Moreover, nowadays, not many companies exclusively service the local community, but service a much broader area within France and sometimes even within the EU. Both the expansion to larger service areas and diversification was observed in all segments related to marine fishing in France.

In the end, while developments in the primary industry at first instance negatively impacted the ancillary industry, it has opened new markets in other industries and geographical areas enabling companies to secure a stable source of income with enough growth opportunities for the future.

The importance of ancillary services looking at the type of services provided, differs between the segments in marine fishing. Although the provision and maintenance of technical equipment and vessels is the predominant activity in marine fishing in all segments, in long-distance fishing, the local infrastructure (e.g. transport, storage facilities, port facilities, et cetera) is also important; the local infrastructure should be able to handle large quantities of fish and provide access to the hinterlands of the port. On the other hand, in industrial fishing and small-scale fishing, the auction is important in the selling process of fresh fish, where in long-distance fishing, the caught fish is mostly sold directly to trading companies under the same group.

One final trend is related to innovation in the sector. What is observed is that ***the marine fishing industry – industrial fishing and long-distance fishing in particular – is becoming increasingly technology-dependent***. ***The introduction of new technology in marine fishing is largely driven by the need for efficiency and the introduction of new regulation***. For instance, the Landing Obligation[77] – first introduced on 1 january 2015 for

[76] Several fishing companies – mainly in trawling – have been found that relocated to countries outside the EU to make up for the decline in fishing activity within the EU.

[77] http://ec.europa.eu/fisheries/cfp/fishing_rules/landing-obligation/index_en.htm

certain parts of the European Union – puts pressure on fishermen to reduce the amount of bycatch. Especially since, according to the Landing Obligation, bycatch is also taken into account in the quota of the species caught. A second example of changing regulation is related to the overall working conditions of fishermen. Since fishing is an occupation that can be physically demanding, working with heavy equipment in heavy circumstances, more regulation is introducted to make fishing a safer and healthier occupation for fishermen.

In the end, both types of regulation gave both primary and ancillary companies an incentive to introduce new, safer, and more efficient technical equipment and vessels. While these are merely two examples, interviewees explained regulation in general is often a driving factor for innovation in the fishing industry. This was something that was recognised by all local experts in for instance the case studies in the Netherlands (see Example 3.7).

Example 3.7 Innovation and regulation at the port of IJmuiden, the Netherlands

Changes in the long-distance fishing industry have mainly been caused by new or changed regulation. Among these are:

- Environmental regulation: New regulation requires fishing companies to introduce a new type of cooling technique that is less harmful to the environment. Companies providing cooling equipment for the fishing industry have anticipated on this and are now providing more environmentally friendly cooling equipment compliant with the new regulation.

- As of 1 January 2015, all fishing companies have to land all the fish they catch. While they used to release bycatch at sea, there are now obligated to land the fish. When the fish has a quota, the catch is also deducted from the quota. This has a large impact on the fishing industry since fishing companies have to be more precise in their fishing activities; catching the wrong species can have a significant impact on their business. In pelagic long-distance fishing the bycatch is 5 to 10%, but given the volumes landed in this type of fishing this concerns several thousand tonnes of fish. In demersal fishing bycatch is much higher and close to 60%. Therefore, fishing companies are keen to introduce new technologies that allows them to reduce bycatch significantly.

On a final note, this trend also has an impact on the competences asked in the ancillary industry. While previously people mostly had lower education, nowadays more-and-more people with higher forms of education are required. This trend is also expected to continue in the near future.

4 The ancillary industry in aquaculture

4.1 Data used

This section describes the main indicators and data sources used to estimate employment and income related to the sector ancillary to aquaculture in the European Union, where first the number of multipliers collected are discussed. Subsequently, external data sources and the primary data used are discussed and this section will be concluded with an explanation on how the results are presented in the remainder of this chapter. Please note that the analysis provided in this section uses findings collected from the case studies as well as findings collected from the desk research performed in this study. In Annex IV the data collected from the desk research is presented separately.

4.1.1 Number of multipliers

Case studies in the aquaculture sector have been performed at a regional level related to four different segments: i) marine finfish aquaculture, ii) trout freshwater aquaculture, iii) freshwater aquaculture related to species other than trout (in the remainder of this section referred to as 'other freshwater aquaculture') and iv) bivalve aquaculture. For each of these segments, information – at a regional level – about employment, income and other socio-economic characteristics (e.g. gender distribution, education level, et cetera) related to both the primary sector and the ancillary sector has been collected and stored in a database[78]. Data has been collected for both 2009 and 2014 to enable analysis on the development over time related to the abovementioned segments and variables[79]. In the end, information collected from individual case studies is used for extrapolation to the level of the European Union. To be able to do this, data related to aquaculture production in each of the segments has also been collected[80]. This production data is used a baseline for extrapolation of the aquaculture data in the four defined segments.

Please note that in the remainder of this section, employment is measured in full time equivalents (FTE) – i.e. the number of full time positions – and income is measure in million Euro, where 1 FTE is defined as 2.000 hours per year[81,82]. Measuring employment in FTE means, that any part-time positions are combined to create a measure of the number of FTE in the sector (e.g. an employee working 1.000 hours per year, is defined as 0,5 FTE).

	Multiplier for employment		Multiplier for income	
	2009	2014	2009	2014
Aquaculture	**17**	**24**	**7**	**9**
Marine finfish aquaculture	6	8	4	4
Trout freshwater aquaculture	5	6	1	1
Other freshwater aquaculture	1	2	0	0
Bivalve	5	8	2	4

Figure 42. Number of calculated multipliers in aquaculture (Source: Case studies)

Figure 42 reveals that the number of multipliers collected from the case studies is limited. Especially income data for trout freshwater aquaculture, other freshwater aquaculture and bivalve aquaculture is only available to a limited extent. In the end, these multipliers provide an important baseline of data for the extrapolation of figures to the European Union. When the number of multipliers is limited, the overall reliability of estimated

78 The sources consulted during the case studies are presented in Annex III

79 Please note that for the case study of marine finfish aquaculture in Murcia and other freshwater aquaculture in Castilla-Léon data for 2013 is used in place of data from 2014, since this is the newest available data for these regions.

80 Unlike for marine fishing, in aquaculture, primary data on employment (in FTE) and income is not publicly available on a Member State level related to the segments identified in this study (only on an aggregated level). Therefore, production data is used in the extrapolation which is further explained in section 4.1.2 on external datasources.

81 http://www.fao.org/fishery/cwp/handbook/G/en.

82 http://datacollection.jrc.ec.europa.eu/dc-socioeco/var/employment

figures based on extrapolation will decrease. Therefore, it is important to bear in mind the limited number of multipliers when analysing the results presented in this section.

Another important thing to note is that due to the unavailability of income data in quite some case studies, income could only be estimated for 2014 and not for 2009. Aside from the fact that income in other freshwater aquaculture cannot be estimated at all as no multipliers have been collected, for the remainder of segments, estimates are too uncertain and the margin of error is too large to provide reliable estimates. In practice, it has been proven difficult to obtain income data as not all interviewees were prepared to share this data with the study team. What is more, this data is not collected by national and regional government as well as national and regional registers on a structural basis. In the end, ancillary income is estimated only for 2014 on the level of the European Union, per Member State and for each subsector identified in aquaculture. Furthermore, regional data for those case studies where income data is collected is presented in paragraph 4.2.3 and 4.3.3.

4.1.2 External data sources

For each case study, data has been collected on the primary sector with respect to production, employment and income. In the end, the combination of data on the primary sector and data on the ancillary sector enables to calculate multipliers needed for the extrapolation of data. Unfortunately, it has not been possible to collect data for 2009 and 2014 for all the case studies. For the Member States where data is not available for 2009 and/or for 2014, but data exists for at least two years, a linear interpolation is used to estimate the employment in the year(s) with missing data. This is for example the case in Bajdu-Bihar (Hungary), where 2012 employment data (most recently available data) is used to calculate employment data in 2014 within the other freshwater aquaculture segment. If there is only one year of data, the growth in the specific port or region is unknown, and the missing value cannot be estimated and thus not taken in account in the extrapolation.

Data on the primary sector needed for the extrapolation has been collected from external data sources, for all of the 28 Member States of the European Union. The available and chosen data sources for primary data related to aquaculture are described in the remainder of this section; data collected by the i) Scientific, Technical and Economic Committee for Fisheries and ii) The Food and Agriculture Organisation of the United Nations.

Data source 1: *Scientific, Technical and Economic Committee for Fisheries - The Economic Performance of the EU aquaculture*

The STECF publishes reports on the economic performance of the aquaculture sector in the EU. For these reports, Member States have reported employment and income in the aquaculture sector. The employment and income can be divided between species, making it possible to divide employment and income between the four aquaculture segments; e.g. marine finfish aquaculture, bivalve aquaculture, freshwater trout aquaculture, and other freshwater aquaculture. Unfortunately, there are some major quality issues with this data, mainly caused by the fact that it is not mandatory for Member States to report data for freshwater aquaculture, and data for this area is therefore estimated based on Eurostat figures. Also, the national chapters do not divide the two aquaculture segments (trout and other) as identified in this study. Furthermore, when comparing the collected data with data on production from other sources, there seem to be some large inconsistencies, such as missing data points and very large income figures. It is therefore chosen to use an alternative data source.

Data source 2: *The Food and Agriculture Organisation of the United Nations - Database of global aquaculture production*

Eurostat and FAO both publish data on the production in the aquaculture sector. Data for this extrapolation is taken from the FAO, which is data based on Eurostat, but with further quality assurance done by the FAO. Also if the data is missing in a year in Eurostat, then FAO has made an estimation for that year. The FAO data therefore covers all EU28 Member States for the years 2009 and 2013. Since data for 2014 is not available, data for 2013 is used in its place. Based on the species, the production can be divided into the four aquaculture segments as described above. The extrapolation therefore uses production multipliers calculated separately for each of the four segments. Unfortunately, primary data is only presented on a Member State level and thus results are only provided on this level and not at a regional level.

4.1.3 Primary data related to aquaculture

As is being explained in Paragraph 4.1.2, the extrapolation is based on primary data related to production in tonnes in the aquaculture sector (Figure 43). Figure 43 provides the baseline of data that is used to calculate

production multipliers (ancillary employment/income divided by primary production, see also paragraph 2.3) and form the basis for the extrapolation to Member States and the European Union[83].

	Production (in tonnes)	
	2009	2014
Aquaculture	**1.447.612**	**1.410.055**
Marine finfish aquaculture	329.556	388.811
Other freshwater aquaculture	360.680	341.144
Trout freshwater aquaculture	108.471	125.324
Bivalve aquaculture	648.904	554.776

Figure 43. Primary sector data related to aquaculture (Source: FAO)

As explained before, the reason for using production data for the extrapolation is that, although data on employment and income is available from the STECF 2014 report, this data cannot be used due to issues with the quality of the data. These issues are mainly caused by the fact that it is not mandatory for Member States to report data on freshwater aquaculture. Therefore, no reliable baseline of data related to primary income and primary employment for the four segments over individual Member States is available and could be used to make accurate estimations of ancillary employment and ancillary income in the European Union, its Member States and different subsectors in aquaculture. Nevertheless, to put things into perspective, an overview of primary income and primary employment in aquaculture is provided in, Figure 44, collected from The Economic Performance of the EU Aquaculture Sector (STECF 14-18)[84][85].

	Employment (in FTE)	Income (in million Euros)
	2012	2012
Aquaculture	34.391	4.259,8
Marine finfish aquaculture	5.684	2.054,3
Other freshwater aquaculture	7.619	392,4
Trout freshwater aquaculture	3.627	598,4
Bivalve aquaculture	17.461	1.214,7

Figure 44. Employment and income in the primary sector related to aquaculture (Source: STECF)

4.1.4 Presentation of results

In presenting the results of the extrapolation, 90% confidence intervals will be used. The confidence intervals are presented to express the uncertainty about the estimates. The 90% confidence intervals are based on confidence intervals for the estimated multipliers. The confidence interval is calculated based on the variation in the multipliers and the number of observations. The interval will be smaller, the lower the variation in the multipliers and the larger the number of observations. Statistically there is a 90% probability that the actual employment and income in ancillary sectors to aquaculture are within the presented confidence interval. It can therefore be said, with 90% percent certainty that the employment and income are within the presented intervals.

When analysing differences between the presented estimates, either over years or between segments, it is important to note whether the analysed difference is significant or not. In the remainder of this chapter, a

[83] Please note that the differences in production technologies are not taken into consideration. However, OLS regressions between production and employment find a positive significant correlation at a significance level of 15 pct. For income, because of the low number of observations, the correlation is lower, but still a positive correlation is found. For reasons explained earlier in the report, alternative data sources on employment and income cannot improve the estimates because of serious flaws in these. Furthermore, there is no data available that could enable to correct for production technologies in the different aquaculture segment/countries. Thus since production is the only variable that we have for the different segments, this is the best estimation that we can make.

[84] Unfortunately, 2012 is the most recent primary data available for aquaculture

[85] Source of the data in this STECF report: EU Member States DCF data submission, 2014

difference is defined to be significant if the confidence intervals of the two estimates are not overlapping; e.g. if comparing an estimate with a confidence interval of 135-1.002 to an estimate with a confidence interval of 116-740, there is no significant difference between the two estimates. If the difference is not significant, it cannot be said with 90% certainty that there is a difference, in other words, the uncertainty about the estimates is too high to conclude that there is a difference between the estimates.

4.2 Employment in the ancillary industry

Combined with ancillary income, ancillary employment is an important factor in determining the economic importance of the sector ancillary to aquaculture, where ancillary employment is estimated at several levels. First of all, employment is estimated in terms of the different segments (e.g. marine finfish aquaculture, trout freshwater aquaculture, other freshwater aquaculture and bivalve aquaculture) and subsectors (e.g. supplies for the aquaculture operation, R+D+I services, et cetera). Second, employment is estimated on different geographical dimensions; e.g. at the level of the European Union, at the level of the Member State, and at the level of individual case studies, including data collected from the desk research. Finally, ancillary employment related to aquaculture is estimated for both 2009 and 2014 to provide insights in the developments during these five years.

As is explained in Paragraph 4.1.1 of this section, employment in the ancillary sector is estimated using production multipliers that were collected from the case studies. In the end, the average production multiplier per segment, multiplied by the production in the primary sector in each segment and Member State, results in an estimation of ancillary employment (see Figure 43 for the primary data used). Figure 45 presents the average production multipliers that were calculated based on the case studies and used in the estimation of ancillary employment, including the number of multipliers collected. A production multiplier of 0,0111 means that for every tonne fish produced, 0,0111 FTE is created (see also paragraoh 2.3.1 for a more detailed explanation and definition of the use of production multipliers).The multiplication of primary employment in each segment with the multipliers presented in Figure 45 results in estimations of employment in each of the aforementioned segments, geographical dimensions and years. With respect to the subsectors, ancillary employment is calculated by taking a percentage of employment in each subsector in the ancillary industry against total estimated employment in the ancillary sector. This is done for each case study, where an average for all case studies per subsector is taken to end up with one percentage per subsector[86]. These percentages are presented in Figure 46[87].

Segment	Average multiplier		Number of multipliers	
	2009	2014	2009	2014
Aquaculture	**0,0111**	**0,0128**	**17**	**24**
Freshwater aquaculture - Other	0,0230	0,0386	1	2
Freshwater aquaculture - Trout	0,0090	0,0080	5	6
Marine finfish aquaculture	0,0131	0,0130	6	8
Bivalve aquaculture	0,0085	0,0098	5	8

Figure 45. Production multipliers in aquaculture, including the number of multipliers collected, used to calculate employment in ancillary services

Subsector	Average % (2009)	Average % (2014)
Activities related to servicing of equipment and / or vessels	**25%**	**34%**
Building and maintaining aquaculture installations	8%	16%
Technical equipment	17%	18%
Supplies for the operation	**40%**	**32%**

[86] For instance, when 4 FTE is found in netting in case study X and the total number of FTE in the ancillary sector in case study X is 10 FTE, netting represents 40% of the employment in the ancillary sector in case study X. These percentages are calculated for netting in each case study and subsequently an average percentage for netting is taken to find one percentage for netting.

[87] The division of employment over the subsectors in aquaculture (including absolute numbers) is discussed in further detail in the subsequent paragraphs in this section.

Subsector	Average % (2009)	Average % (2014)
Feed	32%	28%
Energy (electricity, water and fuel)	1%	1%
Veterinary services	2%	2%
Fertiliseres	0%	1%
Sewage processing	5%	0%
R + D + I Services	**4%**	**4%**
Education and training	2%	2%
Research	2%	1%
Accounting	0%	0%
Management	0%	1%
Insurance	0%	0%
Certification	0%	0%
Activities related to the sale of fish	**31%**	**30%**
Pre-sale processing (slaughtering, processing, depuration)	0%	0%
Handling and packaging	13%	10%
Transport	4%	8%
Storage	0%	0%
Fish trade	14%	12%

Figure 46. Subsectors in aquaculture, including percentage of total ancillary employment

The remainder of this paragraph discusses each dimension on different geographical levels separately, where first employment at the level of the European Union is discussed, after which the Member State level and regional – case study level – is discussed. Furthermore, in each paragraph the different segments and subsectors are discussed. At the regional level, data collected from the desk research will also be taken into account when available and definitions match the definition of ancillary services of this study. In the end, the results are presented in tables as well as geographical maps, including a qualitative interpretation of the results.

4.2.1 Employment in the EU, including segments and subsectors

Total ancillary employment in the European Union was estimated as well as ancillary employment per segment in aquaculture. The results of these estimations are presented in this paragraph, where figures on ancillary employment are provided for aquaculture as a whole, for each segment, and for each of the subsectors identified in the ancillary sector.

Figure 47 shows that in 2009 some 19.000 FTE and in 2014 some 24.500 FTE were employed in the sector ancillary to aquaculture in the European Union. The largest segment in terms of employment is other freshwater aquaculture, in which more than half of the total ancillary employment in 2014 is generated. The largest increase in employment over the past five years also seems to have taken place in this particular segment; in 2009 some 8.000 FTE were employed, which increased to some 13.000 FTE in 2014. Unfortunately, no confidence interval could be calculated for 2009, due to the fact that only one multiplier could be collected from the case studies. Therefore, one has to be careful when interpreting this difference, since it cannot be said with statistical significance that a difference between 2009 and 2014 exists.

Segment	Employment (in FTE)	
	2009	2014
Aquaculture	**19.127 (13.123 - 25.131)**	**24.638 (14.068 - 35.207)**
Marine finfish aquaculture	4.325 (2.870 - 5.781)	5.074 (3.513 - 6.634)

Segment	Employment (in FTE)	
	2009	2014
Other freshwater aquaculture	8.296 (-)	13.151 (6.981 - 19.322)
Trout freshwater aquaculture	979 (478 - 1.481)	998 (512 - 1.484)
Bivalve aquaculture	5.527 (1.479 - 9.574)	5.414 (3.062 - 7.767)

Figure 47. Employment in the sector ancillary to aquaculture per segment

Figure 48 shows the division of ancillary employment over the different subsectors in aquaculture over Europe. From the four subcategories, activities related to servicing of equipment and/or vessels, supplies for the operation and activities related to the sale of fish all employ around 30% of the ancillary employment over the European Union. Traditionally, feed is one of the most important ancillary activities related to aquaculture. This is reflected in the large employment in this subsector for both 2009 and 2014. There seems to be a large increase in employment related to building and maintaining of aquaculture installations, where employment seems to have more than doubled from 2009 to 2014. From the case studies it became clear that more-and-more aquaculture companies request specialised services related to technical equipment. The increased demand in these type of services seems to also be reflected in the figures presented in Figure 48. Paragraph 4.3 will further elaborate on this development when discussing the trends in the ancillary industry.

Subsector[88]	Employment (in FTE	
	2009	2014
Total	**19.127**	**24.638**
Activities related to servicing of equipment and / or vessels	**4.801**	**8.341**
Building and maintaining aquaculture installations	1.522	4.023
Technical equipment	3.279	4.318
Supplies for the operation	**7.659**	**7.622**
Feed	6.021	6.689
Energy (electricity, water and fuel)	248	284
Veterinary services	408	413
Fertilisers	N/A	236
Sewage processing	982	N/A
R + D + I Services	**740**	**1.254**
Education and training	302	484
Research	333	369
Accounting	15	15
Management	N/A	304
Insurance	66	66
Certification	15	15
Activities related to the sale of fish	**5.928**	**7.420**
Pre-sale processing	90	75
Handling and packaging	2.440	2.499
Transport	766	1.964
Fish trade	2.632	2.881

[88] The totals in subsectors might differ slightly, due to small roundings in the underlying data.

Figure 48. Employment in subsectors in the sector ancillary to aquaculture

4.2.2 Employment in Member States, including subsectors[89]

Using the same method used for the estimation of ancillary employment on the level of the European Union, ancillary employment can also be estimated for each Member State, of which the results are presented in Figure 49 – including 90% confidence intervals – and in a geographical map in Figure 50.

Member State	Employment (in FTE)[90]		Member State	Employment (in FTE)	
	2009	2014		2009	2014
Austria	27 (20 - 35)	68 (36 - 101)	Italy	2.148 (1.430 - 2.867)	2.999 (1.642 - 4.355)
Belgium	10 (10 - 11)	2 (1 - 2)	Latvia	1.554 (1.315 - 1.792)	2.104 (1.109 - 3.099)
Bulgaria	123 (107 - 139)	393 (209 - 577)	Lithuania	198 (101 - 295)	194 (100 - 287)
Croatia	136 (92 - 180)	157 (98 - 216)	Luxemburg	N/A (-)	N/A (-)
Cyprus	44 (29 - 59)	75 (52 - 98)	Malta	84 (72 - 97)	222 (127 - 317)
Czech Republic	830 (827 - 833)	1.337 (710 - 1.964)	Netherlands	418 (121 - 715)	609 (343 - 874)
Denmark	912 (839 - 986)	1.359 (744 - 1.973)	Poland	990 (987 - 992)	1.150 (610 - 1.690)
Estonia	612 (612 - 612)	412 (219 - 605)	Portugal	60 (28 - 91)	104 (66 - 143)
Finland	28 (15 - 40)	32 (17 - 48)	Romania	101 (101 - 101)	208 (110 - 305)
France	2.134 (945 - 3.323)	2.219 (1.242 - 3.196)	Slovakia	215 (215 - 215)	347 (184 - 510)
Germany	768 (640 - 896)	1.069 (565 - 1.573)	Slovenia	31 (26 - 37)	57 (30 - 84)
Greece	1.479 (916 - 2.042)	1.925 (1.303 - 2.547)	Spain	2.344 (891 - 3.798)	2.153 (1.281 - 3.025)
Hungary	389 (389 - 389)	796 (423 - 1.170)	Sweden	152 (127 - 178)	281 (157 - 405)
Ireland	476 (208 - 743)	348 (210 - 486)	United Kingdom	2.863 (2.061 - 3.665)	4.018 (2.481 - 5.554)

Figure 49. Employment in the sector ancillary to aquaculture per Member State

[89] Please note that ancillary employment is also further specified per segment and per subsector in Annex VI.

[90] The totals from Member States might differ slightly from the totals at EU-level, due to small roundings in the underlying data

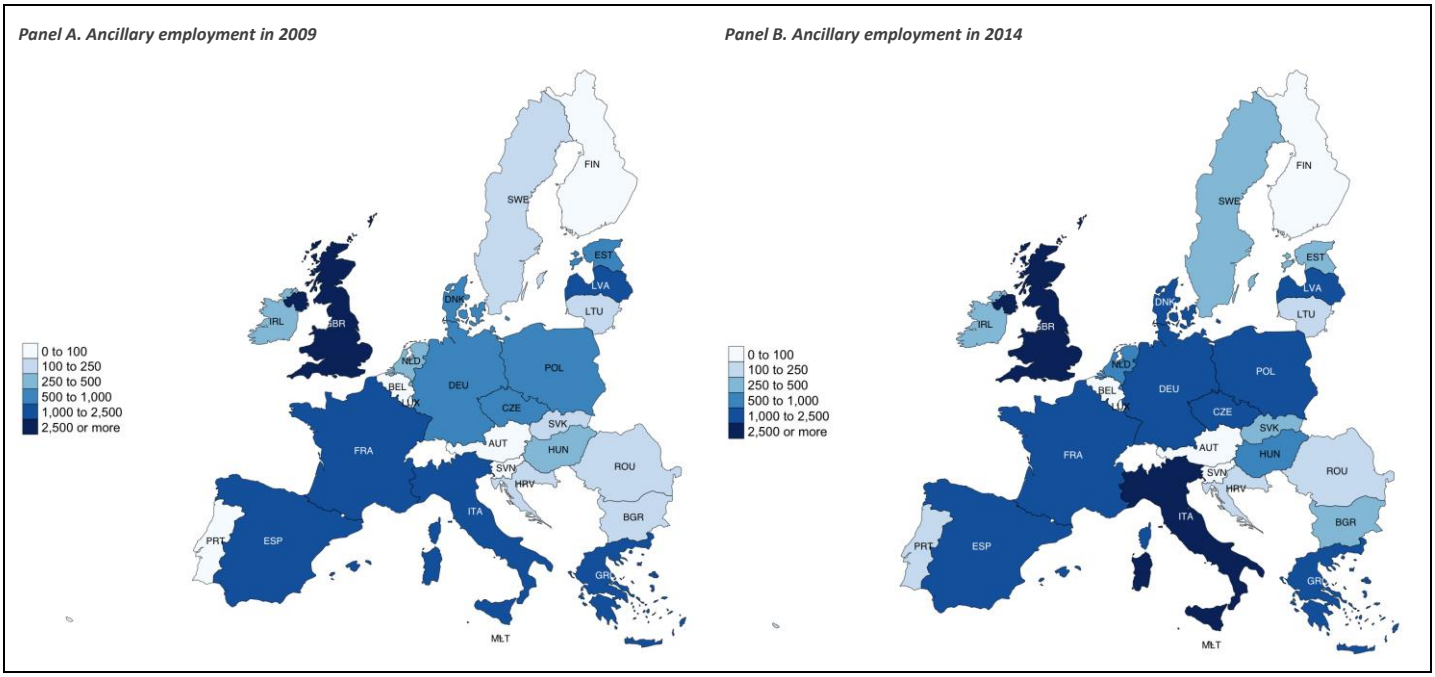


Figure 50. Ancillary employment in activities ancillary to aquaculture, 2009 and 2014

What becomes clear from Figure 49 and Figure 50 is that the United Kingdom, Italy and Spain are the Member States with the highest employment levels looking at the aquaculture ancillary sector. In 2014, the United Kingdom seems to employ most FTE in activities ancillary to aquaculture. The increase in employment in the United Kingdom between 2009 and 2014 seems to be the highest compared to all other Member States, mainly due to an increase in the aquaculture production in the United Kingdom. Other Member States with significant employment in the ancillary sector are France, Greece and Latvia.

Looking at differences between 2009 and 2014 it is noteworthy that some countries in Eastern Europe faced a significant increase in employment looking at the ancillary sector. Although not very large in absolute numbers, in relative terms, countries like Bulgaria, Hungary and Romania faced a relatively large increase in employment between 2009 and 2014. In absolute terms, the increase in employment in the United Kingdom is most appealing. In general, employment in the ancillary sector showed a positive trend, but there are exceptions in for example Spain and Estonia where a (small) decrease in employment figures in displayed.

The division of ancillary employment over the subsectors in aquaculture is presented in Figure 51 and is also presented in geographical maps in Figure 52 and Figure 53, where employment is presented in number of FTE. in the division of employment over the subsectors provides valuable insights in which subsectors are responsible for the differences found in overall employment levels between 2009 and 2014. In the United Kingdom for example, the increase in employment is for a large part related to the increase in employment related to activities related to the servicing of equipment and/or vessels. These figures suggest that for the United Kingdom, employment over the past five years has almost doubled in this subsector of the ancillary industry in aquaculture. Similarly, the decrease in employment in Spain is caused by a sharp decrease in employment related to supplies for the operation. This trend is not recognised throughout the European Union, as supplies for the operation seems to be a quite stable supplier of employment in most Member States.

Services related to R+D+I seems to have experienced an increase in employment over the period 2009 to 2014. Furthermore, Figure 53 shows that the 'larger' Member States in the European Union (e.g. UK, France, Italy and Spain) are estimated to have over 100 FTE working in this subsector in 2014.

Example 4.1 provides an interesting insight in how the demand for different ancillary products has developed over the past years.

Example 4.1 The ancillary industry in Greece

In Greece, the majority of the ancillary activities related to aquaculture are performed locally such as packaging, trade and pre-processing activities. Other ancillary activities are performed in larger and more concentrated cities such as Thessaloniki and Athens, which supply the (technical) equipment and other supplies for the aquaculture industry (mainly feed). What must be noted is that the larger aquaculture production firms are to a large extent vertically integrated, performing all kind of activities themselves, which reduced the demand for more general ancillary services. This means that the demand for ancillary activities has stabilized in Greece, and only the demand for more specialised and local services has increased. The increase in demand for local ancillary services is mainly due to the price recovery of the last two years, which resulted in increasing activities related to packing and trade and an increase in employment in these sectors.

	Total		Activities related to servicing of equipment and / or vessels		Supplies for the operation		R + D + I Services		Activities related to the sale of fish	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**19.127**	**24.638**	**4.800**	**8.342**	**7.659**	**7.622**	**740**	**1.254**	**5.928**	**7.420**
Austria	**27**	**68**	7	23	11	21	1	3	8	21
Belgium	**10**	**2**	3	1	4	1	N/A	N/A	3	N/A
Bulgaria	**123**	**393**	31	133	49	122	5	20	38	118
Croatia	**136**	**157**	34	53	54	49	5	8	42	47
Cyprus	**44**	**75**	11	25	18	23	2	4	14	23
Czech Republic	**830**	**1.337**	208	453	332	414	32	68	257	403
Denmark	**912**	**1.359**	229	460	365	420	35	69	283	409
Estonia	**612**	**412**	154	139	245	127	24	21	190	124
Finland	**28**	**32**	7	11	11	10	1	2	9	10
France	**2.134**	**2.219**	536	751	855	686	83	113	661	668
Germany	**768**	**1.069**	193	362	308	331	30	54	238	322
Greece	**1.479**	**1.925**	371	652	592	595	57	98	458	580
Hungary	**389**	**796**	98	270	156	246	15	41	121	240
Ireland	**476**	**348**	119	118	190	108	18	18	147	105
Italy	**2.148**	**2.999**	539	1.015	860	928	83	153	666	903
Latvia	**1.554**	**2.104**	390	712	622	651	60	107	482	634
Lithuania	**198**	**194**	50	66	79	60	8	10	61	58
Luxemburg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**84**	**222**	21	75	34	69	3	11	26	67
Netherlands	**418**	**609**	105	206	167	188	16	31	130	183
Poland	**990**	**1.150**	248	389	396	356	38	59	307	346
Portugal	**60**	**104**	15	35	24	32	2	5	18	31
Romania	**101**	**208**	25	70	40	64	4	11	31	63
Slovakia	**215**	**347**	54	118	86	107	8	18	67	105
Slovenia	**31**	**57**	8	19	13	18	1	3	10	17
Spain	**2.344**	**2.153**	588	729	939	666	91	110	727	649
Sweden	**152**	**281**	38	95	61	87	6	14	47	85

	Total		Activities related to servicing of equipment and / or vessels		Supplies for the operation		R + D + I Services		Activities related to the sale of fish	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
United Kingdom	**2.863**	**4.018**	719	1.360	1.146	1.243	111	204	887	1.210

Figure 51. Employment per sub-activity in the sector ancillary to aquaculture

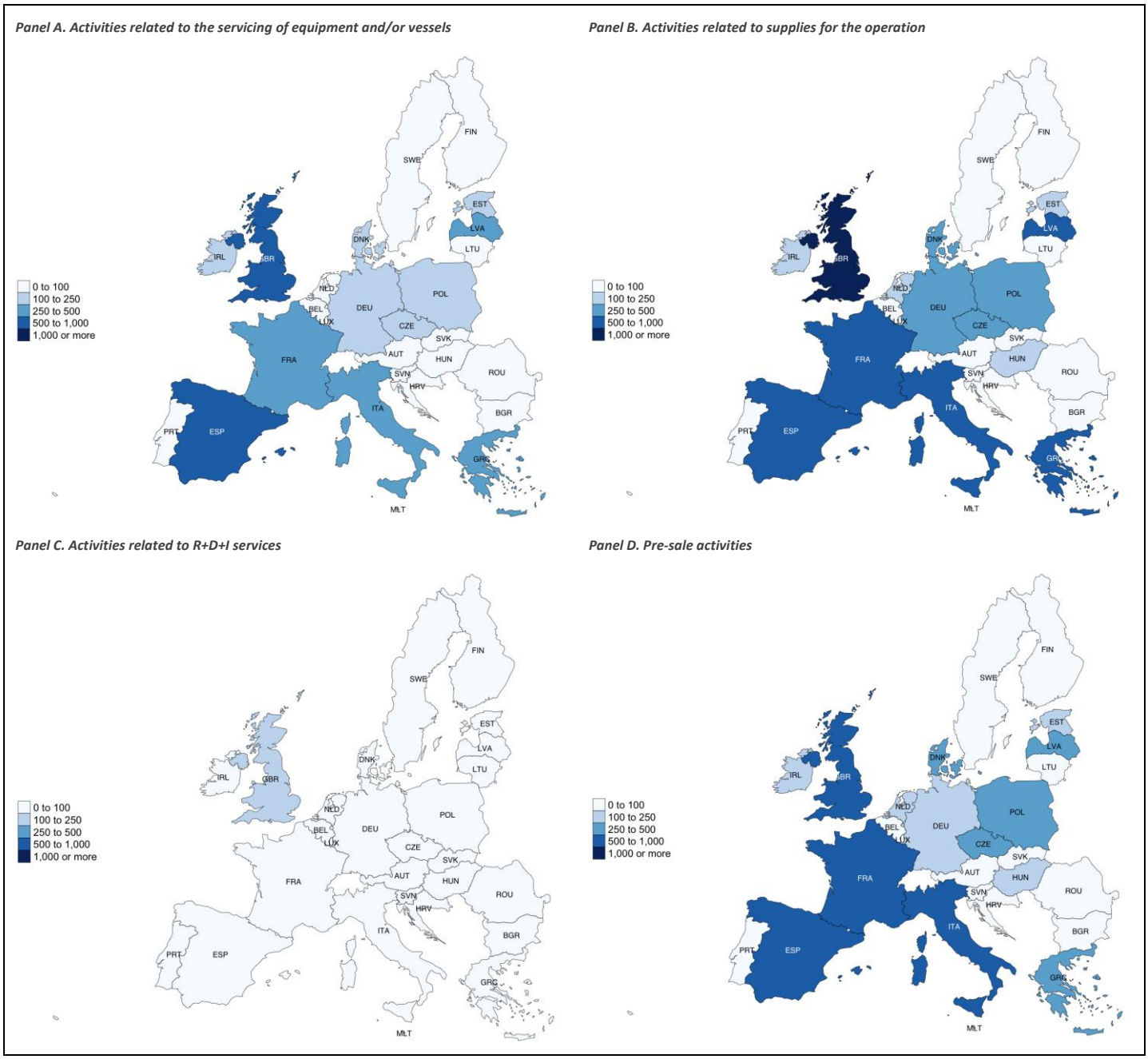


Figure 52. Employment per sub-activity in the sector ancillary to aquaculture in 2009

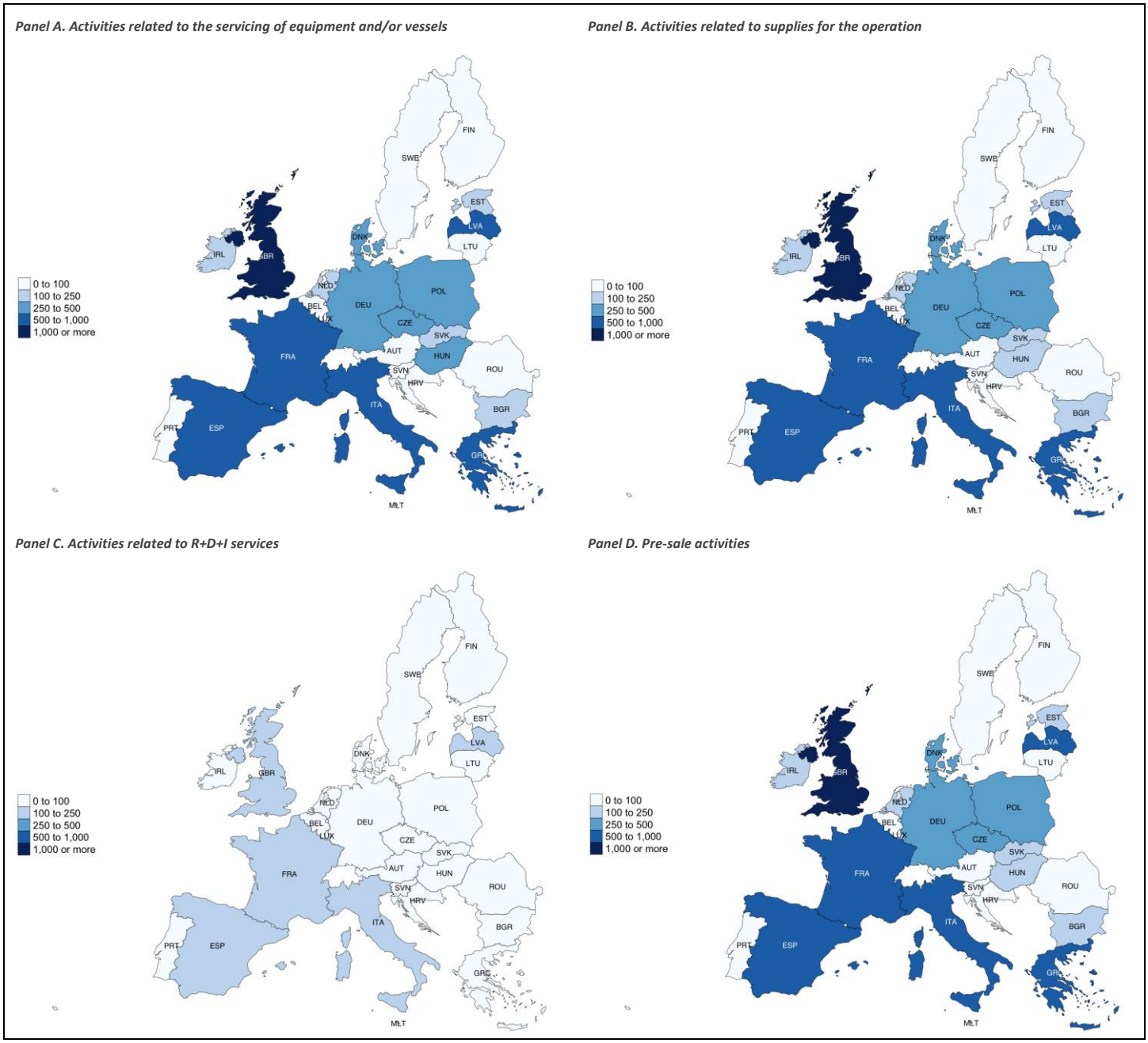


Figure 53. Employment per sub-activity in the sector ancillary to aquaculture in 2014

4.2.3 Regional overview and contribution to local economies

As was explained before, the case studies performed throughout the Europe Union formed the basis for the level of employment estimated for the European Union and its Member States. In this paragraph, a regional overview of employment data and employment multipliers are presented in both table-form (Figure 55) and geographical maps (Figure 56 and Figure 57) that are further complemented by usable findings from the desk research for this study[91].

In Figure 56, the estimated ancillary employment is presented in a geographical map, where each point represents a case study or multiplier found during the desk research. In terms of interpretation, when looking for instance at Valencia in Spain, 72 FTE (67 FTE) was found in the sector ancillary to marine finfish aquaculture

[91] Only those findings of the desk research are taken into account in which a similar definition to ancillary services is provided as in this study, e.g. activities up to the First point of sale.

in the region of Velancia in 2009 (2014). With respect to Figure 57, each point on the geographical map represents an employment multiplier. Hence, when looking for instance at Poitou-Charentes in France, an employment multiplier of 0,27 (0,32) was found in 2009 (2014). Meaning, related to bivalve aquaculture in this region, the employment in the sector ancillary to bivalve aquauclture was estimated to employ 0,27 FTE (0,32 FTE) in 2009 (2014).

From the multipliers presented in Figure 57, it can be concluded that ancillary employment related to bivalve aquaculture and trout freshwater aquaculture – with an average multiplier of 0,3 – generally have lower multipliers than those found for other freshwater aquaculture and marine finfish aquaculture, where the average seems to be around 1,0. Meaning, for every employee in the primary aquaculture sector, 0,3 (1,0) FTE is working in the sector ancillary to bivalve aquaculture and trout freshwater aquaculture (other freshwater aquaculture and marine finfish aquaculture respectively). Figure 54 provides this overview of employment multipliers for the different aquaculture segments, for both 2009 and 2014.

Segment	Employment multiplier
Marine finfish aquaculture	1,0
Other freshwater aquaculture	1,0
Trout freshwater aquaculture	0,3
Bivalve aquauclture	0,3

Figure 54. Employment multipliers in aquaculture by segment (2009 and 2014)

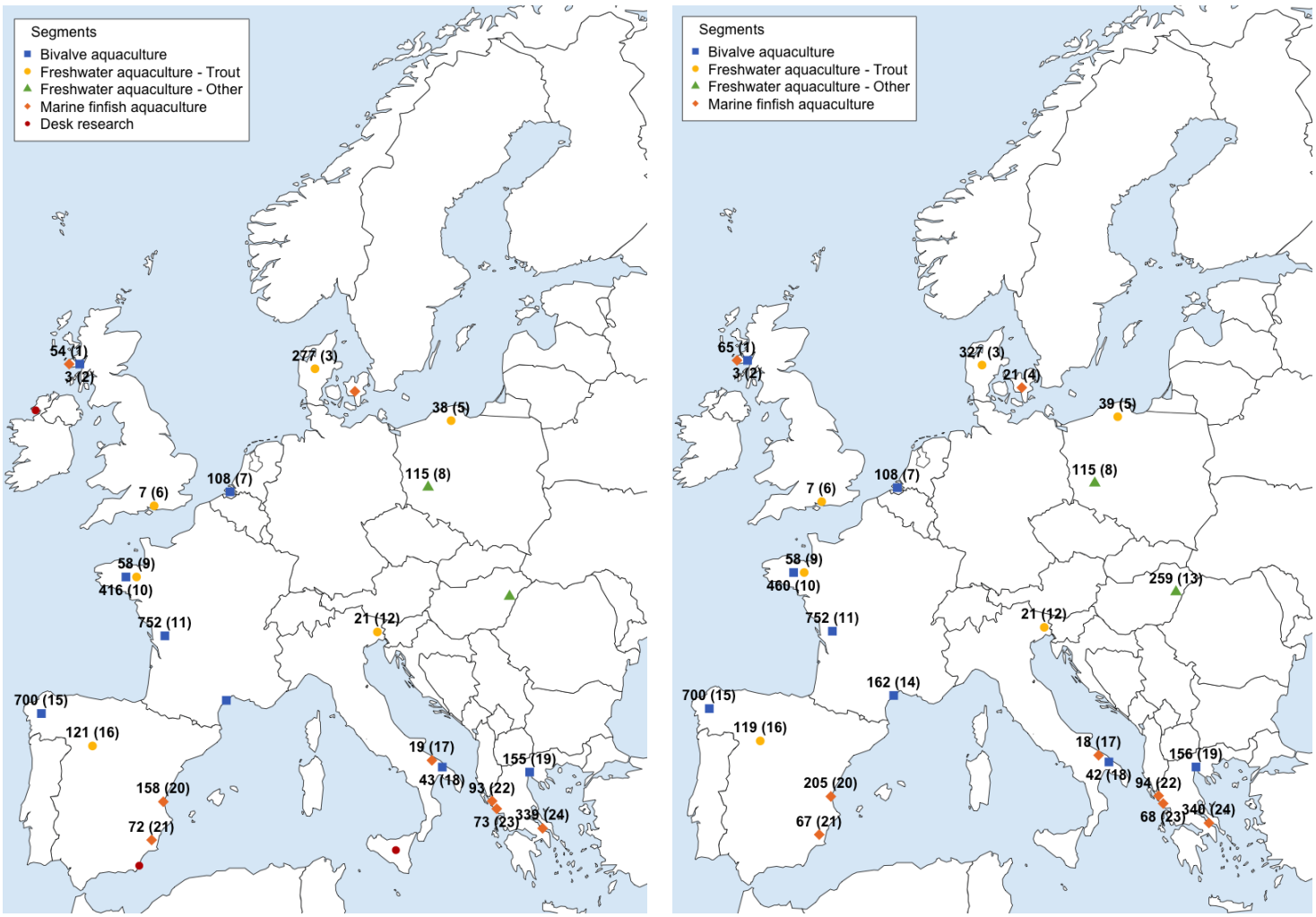
Historically, bivalve aquaculture has a low demand for ancillary activities, as the production of, for example mussels and oysters, does not require much ancillary activities, such as feed. Hence, explaining the relatively low employment multiplier found. Looking at trout freshwater aquaculture, this type of aquaculture deals with a very sensitive specie, making these aquaculture companies not very keen to open their production sites to other people or companies; they perform the activities related to the production of freshwater trout themselves as much as possible, reducing overall demand for ancillary services. This also explains the relatively low multiplier in trout freshwater aquaculture.

What can further be seen in Figure 57 is that employment multipliers in Southern Europe (e.g. France, Spain, Italy, Greece) generally are lower than those found in the Northern part of Europe (e.g. United Kingdom and Denmark). The reason for this difference seems to be the level of specialisation and export possibilities the ancillary companies have in Denmark and the United Kingdom compared to others parts of the European Union. Especially in activities related to the provision of technical installations, these countries have specialised themselves in the past few years and serve demand in other parts of Europe as well. This makes the ancillary sector relatively large in these parts of Europe compared to the primary sector, which explain the relatively high multiplier in these Member States. In paragraph 4.3 this trend is described in more detail.

Country	Area	Segment	Ancillary employment		Employment multiplier	
			2009	2014	2009	2014
Denmark	Central Jutland	Freshwater aquaculture - Trout	277	327	1,60	1,82
Denmark	Sjaelland	Marine finfish aquaculture		21		0,28
France	Bretagne	Freshwater aquaculture - Trout	58	58	0,50	0,51
France	Bretagne	Bivalve aquaculture	416	460	0,19	0,24
France	Etang-de-thau	Bivalve aquaculture		162		0,13
France	Poitou-Charentes	Bivalve aquaculture	752	752	0,27	0,32
Greece	Halastra	Bivalve aquaculture	155	156	1,48	1,51
Greece	Halkida	Marine finfish aquaculture	339	340	0,98	0,91
Greece	Preveza	Marine finfish aquaculture	73	68	0,75	0,78
Greece	Thesprotia	Marine finfish aquaculture	93	94	0,29	0,28
Hungary	Hajdu-Bihar	Freshwater aquaculture - Other		259		1,15
Italy	Friuli	Freshwater aquaculture - Trout	21	21	0,19	0,19

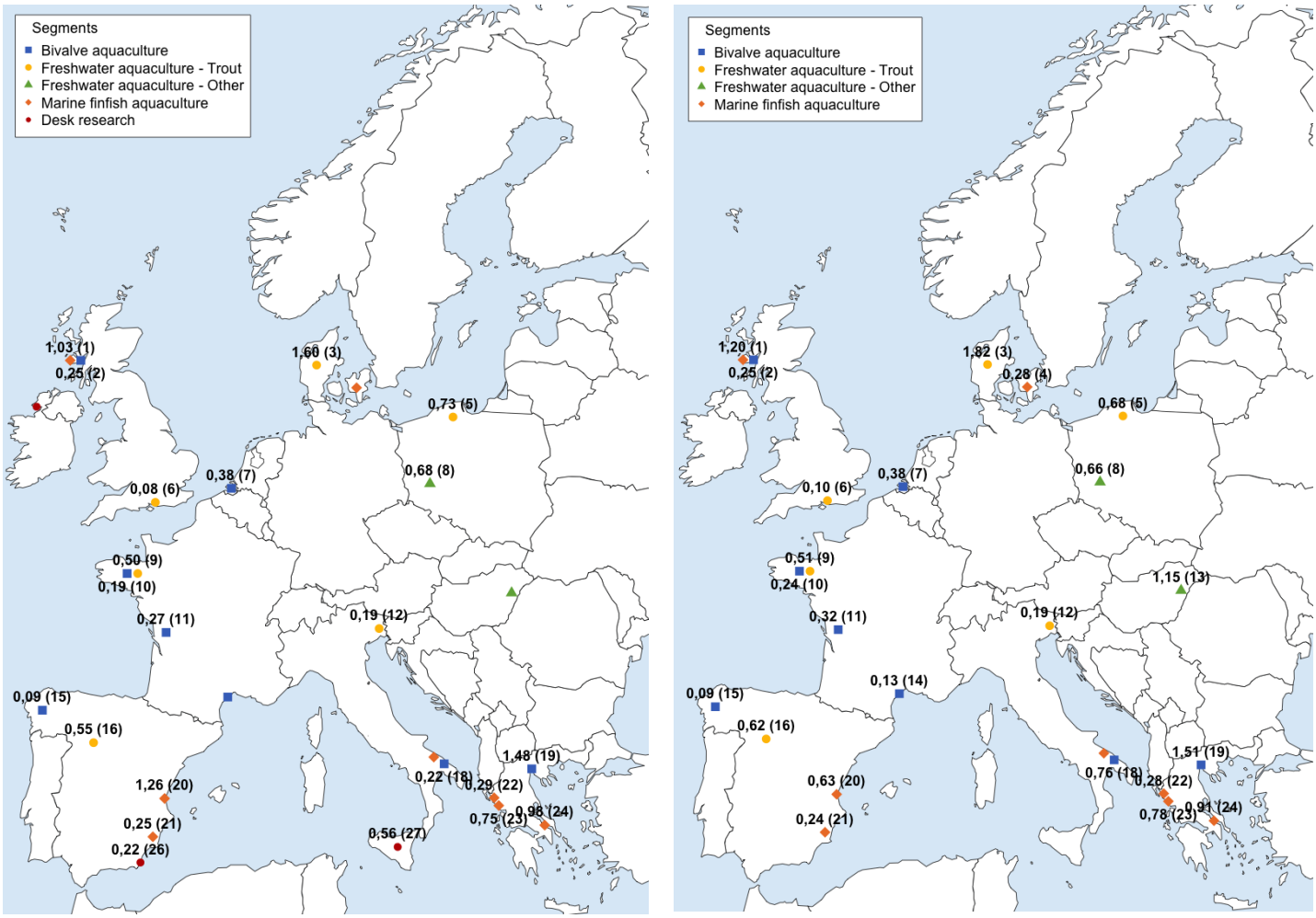
Country	Area	Segment	Ancillary employment		Employment multiplier	
			2009	2014	2009	2014
Italy	Puglia	Marine finfish aquaculture	19	18		
Italy	Puglia	Bivalve aquaculture	43	42	0,22	0,76
Italy	Sicily	Desk research			0,56	
Netherlands	Zeeland	Bivalve aquaculture	108	108	0,38	0,38
Poland	Barycz Valley	Freshwater aquaculture - Other	115	115	0,68	0,66
Poland	Morenka	Freshwater aquaculture - Trout	38	39	0,73	0,68
Spain	Carboneras	Desk research			0,22	
Spain	Castilla Leon	Freshwater aquaculture - Trout	121	119	0,55	0,62
Spain	Galicia	Bivalve aquaculture	700	700	0,09	0,09
Spain	Murcia	Marine finfish aquaculture	72	67	0,25	0,24
Spain	Valencia	Marine finfish aquaculture	158	205	1,26	0,63
United Kingdom	Hampshire/Wiltshire	Freshwater aquaculture - Trout	7	7	0,08	0,10
United Kingdom	Isle of Mull	Marine finfish aquaculture	54	65	1,03	1,20
United Kingdom	Isle of Mull	Bivalve aquaculture	3	3	0,25	0,25

Figure 55. Regional analysis aquaculture - Employment



(1) Isle of Mull, UK (2) Isle of Mull, UK (3) Central Jutland, DK (4) Sjaelland, DK (5) Morenka, PL (6) Hampshire/Wiltshire, UK (7) Zeeland, NL (8) Barycz Valley, PL (9) Bretagne, FR (10) Bretagne, FR (11) Poitou-Charentes, FR (12) Friuli, IT (13) Hajdu-Bihar, HU (14) Etang-de-Thau, FR (15) Galicia, ES (16) Castilla Leon, ES (17) Puglia, IT (18) Puglia, IT (19) Halastra, EL (20) Valencia, ES (21) Murcia, ES (22) Thresprotia, EL (23) Preveza, EL (24) Halkia, EL (25) Killybegs, UK (26) Carboneras, ES (27) Sicily, IT

Figure 56. Regional overview of employment in activities ancillary to aquaculture (source: Desk research & Case studies)



(1) Isle of Mull, UK (2) Isle of Mull, UK (3) Central Jutland, DK (4) Sjaelland, DK (5) Morenka, PL (6) Hampshire/Wiltshire, UK (7) Zeeland, NL (8) Barycz Valley, PL (9) Bretagne, FR (10) Bretagne, FR (11) Poitou-Charentes, FR (12) Friuli, IT (13) Hajdu-Bihar, HU (14) Etang-de-Thau, FR (15) Galicia, ES (16) Castilla Leon, ES (17) Puglia, IT (18) Puglia, IT (19) Halastra, EL (20) Valencia, ES (21) Murcia, ES (22) Thresprotia, EL (23) Preveza, EL (24) Halkia, EL (25) Killybegs, UK (26) Carboneras, ES (27) Sicily, IT

Figure 57. Regional overview of employment multipliers in activities ancillary to aquaculture (source: Desk research & Case studies)

4.2.4 Total number of employees

The EU aquaculture sector has a substantial component of part-time work, which is also higher than the level of part-time involvement in marine fishing. The STECF report on aquaculture includes data on 18 Member States and shows that the ratio for the EU aquaculture sector was 0.5 in 2012[92]. In other words, the average employee in aquaculture only is a fish farmer for 50% of the time, or 1.000 hours per year. In small-scale fishing this was estimated to be around 0.6 and in industrial fishing the part-time ratio was around 0.9[93]. Hence, part-time involvement in the primary sector related to aquaculture is significant. This large proportion of part time workers in aquaculture, with lowest ratio in bivalve aquaculture (0.41 ratio for 2012), is due to the narrow harvesting season of many species. During the harvesting season many temporary workers are used, which can be only several months a year. For instance, the main bivalve specie - mussels - are usually harvested in one to three months time, making the demand for seasonal workers very high during that period of time.

The data for the part-time ratio for the ancillary sector related to aquaculture is limited. Overall, based on the case studies, part-time involvement in the ancillary sector seems (much) lower compared to the primary aquaculture sector. Based on a rough estimation the part-time ratio in the ancillary sector would be in the

[92] The Economic Performance of the EU Aquaculture Sector (STECF 14-18). 2012 is latest available data.

[93] The 2014 Annual Economic Report on the EU Fishing Fleet (STECF 14-16)

range of 0.8 - 0.9. This is explained by the fact that work in the ancillary sector is less seasonal, which makes it generally easier to plan, decreasing the demand for temporary workers. Furthermore, ancillary companies have diversified their activities into many more sectors and areas beyond the local community, which provide a more solid basis for work. This enables ancillary companies to offer more full time jobs to employees, compared to the primary sector.

The example below illustrates how the use of specialised ancillary services decreased the need for temporary employment in the primary sector in this specific example.

Example 4.2 How the use of well-boats in Scotland decrease the number of temporary workers in the primary aquaculture sector

A specific example of specialisation in the ancillary services industry, which decreased the number of temporary workers in the primary Scottish aquaculture salmon industry, is found in the form of so-called well-boats. Salmon used to be harvested at the net using service vessels operated from the shore base for the specific farms. Over the last ten to fifteen years, the use of specialist well boats to carry live Scottish salmon to the processing plants / butchering stations has become more common until today where it is now the norm in salmon aquaculture. During the past ten to fifteen years the size of these vessels has increased substantially, to the point now where a vessel can cost upwards of €10M; few salmon farming companies now own their own well-boats, and instead contract-in specialist operators. Almost all these operators are Norwegian, and those vessels servicing the Scottish salmon farming industry are based at ports around Scottish west coast (notably Oban) and islands – i.e. the vessel related benefits – employment, vessel servicing and company profits – tend to be to the Norwegian economy, and not to the Mull or Scottish economies. The so-called well-boat vessels are used for harvesting, but also for sorting and grading fish during the production cycle, and also for delivery of medication.

4.2.5 Socio economic data on gender distribution per segment

Related to socio-economic characteristics of the ancillary sector, clearly more women are active in this sector compared to the production sector in aquaculture (more than 80% of employees in production firms are males[94]). In the ancillary sector a more equal gender distribution is found, were women fill jobs related to administration, packing and handling, R&D and depuration.

Based on the case studies conducted during this study, Figure 58 and Figure 59 show the gender distribution on a regional basis divided over the different subsectors. In activities related to R+D+I and pre-sale activities, there is a more or less equal distribution of male-female employees in most areas. For activities related to the servicing of equipment and/or vessels and activities related to supplies for the operation male are dominant in most areas. This can be explained due to the nature of the work, where work related to activities related to the servicing of equipment and/or vessels and activities related to supplies for the operation are more demanding physically and therefore better suited for the males to perform. Differences between 2009 and 2014 are hard to observe, more observations and a longer period of time might be necessary to study these type of changes in gender distribution over specific subsectors.

[94] The Economic Performance of the EU Aquaculture Sector (STECF 14-18)

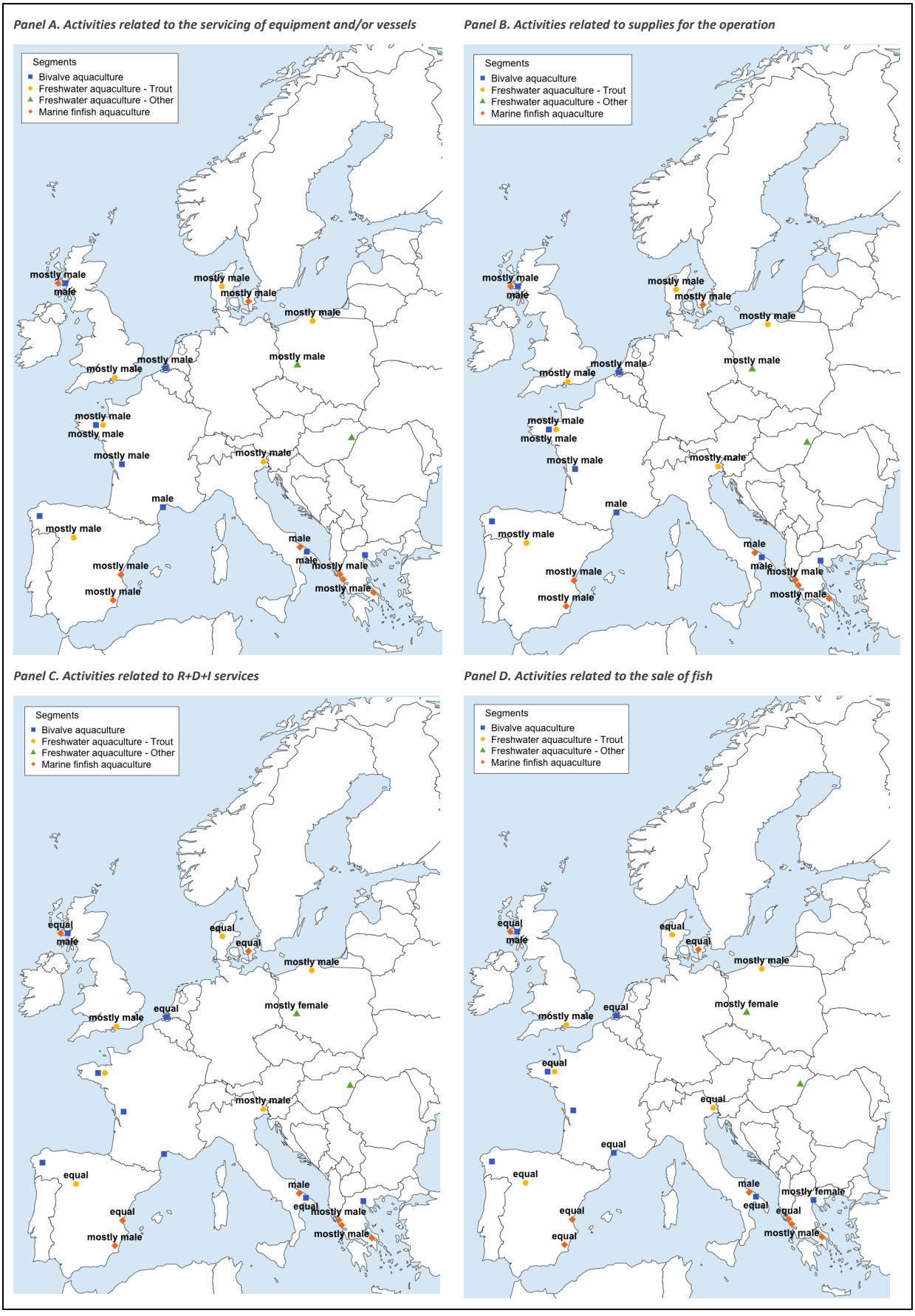


Figure 58. Gender distribution in the sector ancillary to aquaculture in 2009, including its subsectors (source: Case studies)

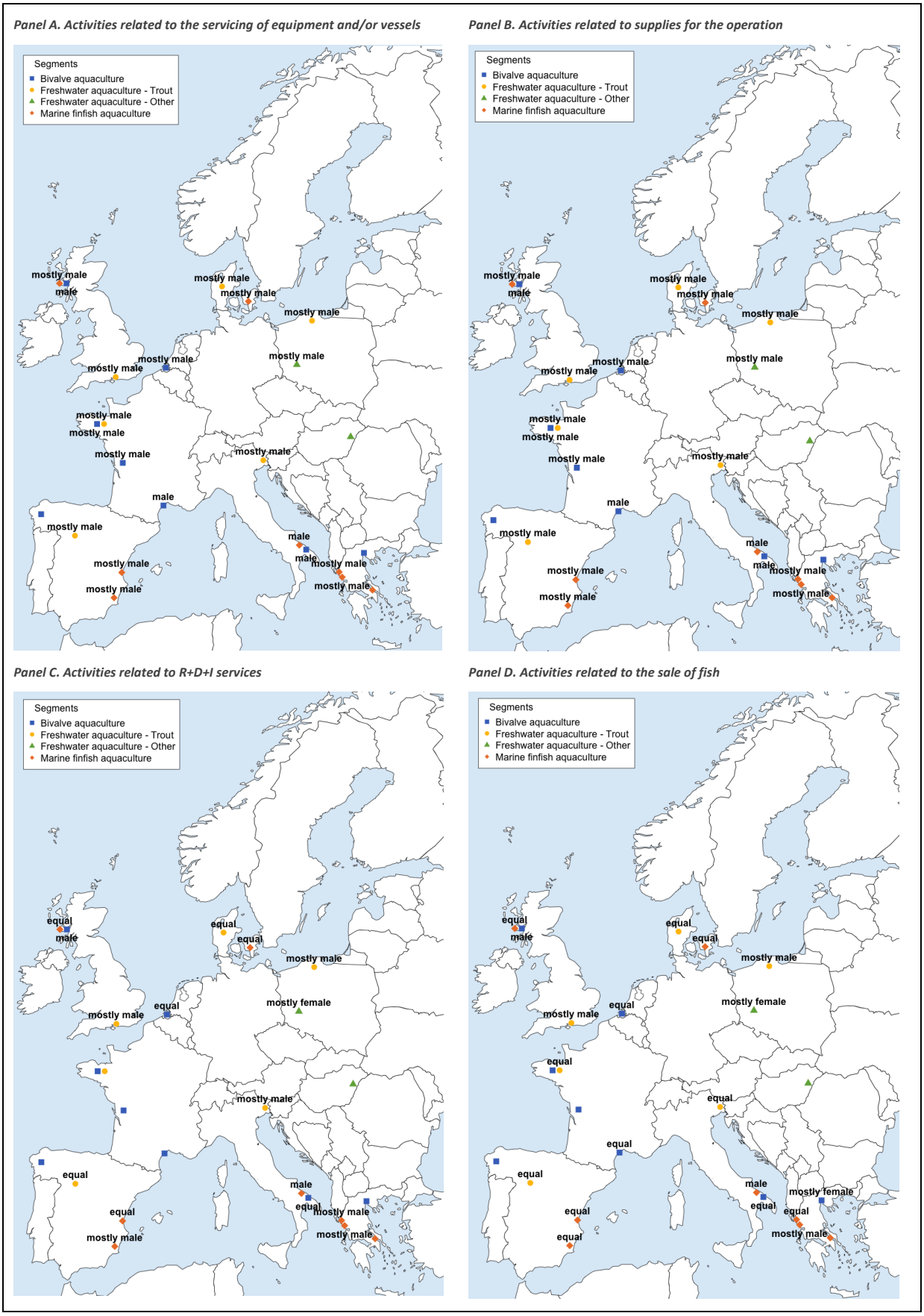


Figure 59. Gender distribution in the sector ancillary to aquaculture in 2014, including its subsectors (source: Case studies)

4.2.6 Socio economic data on unpaid versus paid labour

To provide statistical data on the division of unpaid and paid labour in the ancillary sector is not possible based on findings from the case studies. In general, what can be said is that unpaid labour is of less importance to ancillary service providers compared to the primary production sector. Some unpaid labour is observed in smaller ancillary companies, where family members participate in the company, but otherwise unpaid labour is used only on a very small scale. Nevertheless, one example is found at a net maker is Spain, where the wife of the net maker helps out during the busy periods.

In the primary sector, much more unpaid labour is found, and especially in the bivalve aquaculture. According to 'The Economic Performance of the EU Aquaculture Sector (STECF 14-18)', the level of unpaid labour in bivalve aquaculture is as much as 43% of the total employment in this sector. In less capital intensive production firms, especially in the Southern part of Europe, the percentages of unpaid labour are higher than in capital intensive firms (mostly in the Netherlands and UK). This is confirmed during the case studies, where production firms indicate that during busy harvesting season, often family members help out. Furthermore, in Hungary aquaculture firms help each other out on certain activities. This can be seen as a form of unpaid labour, where services are being exchanged between firms.

4.2.7 Socio economic data on foreign versus national labour

To provide statistical data or a percentage distribution of foreign versus national labour in the sector ancillary to aquaculture is not possible based on the case study data. However, in general terms, most ancillary services seem to be provided locally and therefore the majority of the workforce in ancillary services is of local origin, with minimal foreign involvement. In this respect, there are two other things worth mentioning:

1. In Greece, the number of local people active in ancillary services has increased over the past five years. Due to the economic crisis more and more Greeks are becoming active in this sector again. In Thesprotia, for example, the percentage of foreigners active in ancillary services in 2009 was around 10% and has decreased to some 5% in 2014. Same trends are observed in Halastra and Preveza. In Halastra in 2009, 50% of the workforce in ancillary services is of foreign origin (mainly people from Albania, where wages were 30% lower than wages of Greek employees). Due to the economic crisis and the increasing number of Greeks willing to work in the ancillary sector, this percentage of foreign workers has declined in 2014.
2. In two Danish case studies, in Zeeland and Central Jutland, another recent trend is observed. The majority of employees in the ancillary sector is of Danish origin, with some being from other European Member States. A large feed production company in Denmark recently employed 4 German R&D scientists, as there is an education in Germany that is complementary to the research in production of feed for aquaculture. This education is not available in Denmark but very relevant for the company, therefore foreign specific knowledge is asked and employed.

4.2.8 Socio economic data on age of workforce

Unfortunately, based on the case study results, it is not possible to include data on the age of the workforce. Although quite some socio economic data was requested during the case studies, this does not provide a bass line that is enough to draw reliable conclusion on the age of the workforce in activities ancillary to aquaculture.

4.3 Income in the ancillary industry

Figure 60 presents the production multipliers related to income in the four different aquaculture segments defined during this study. The average multiplier is around 0,0013 in 2009 and around 0,0020 in 2014, meaning that in a region with a production of 100 tonnes, the estimated income generated in the sector ancillary to aquaculture is around 0,13M (0,20) euro in 2009 (2014).

What stands out is that for other freshwater aquaculture, the case studies did not provide any income multipliers that could be used in the extrapolation. This is the reason why no further split to segments can be provided (e.g. on Member State level). To solve this, the study team tried to gather specific freshwater aquaculture multipliers from desk research with a more or less same definition as used during this study.

Unfortunately, this data was not found and hence the multiplier on other freshwater aquaculture can not be estimated. In addition, for the remaining segments a relatively limit number of multipliers is collected. In the end, this will influence the accurateness of the estimations provided in this paragraph, that one has to keep in mind when interpreting the results.

Looking at differences between the segments presented in Figure 60, trout freshwater aquaculture and marine finfish aquaculture generate the most income per produced tonne, where bivalve aquaculture provides the least. Looking at the development over time, an increase in income per produced tonne has been observed between 2009 and 2014 for all segments.

Segment	Average multiplier		Number of multipliers	
	2009	2014	2009	2014
Aquaculture	**0,0013**	**0,0020**	**7**	**9**
Freshwater aquaculture - Other			0	0
Freshwater aquaculture - Trout	0,0019	0,0027	1	1
Marine finfish aquaculture	0,0015	0,0022	4	4
Bivalve aquaculture	0,0005	0,0016	2	4

Figure 60. Income multiplier in aquaculture related to the production in aquaculture, including the number of multipliers collected

Subsector	Average % (2009)	Average % (2014)
Activities related to servicing of equipment and / or vessels	26%	21%
Supplies for the operation	50%	48%
R + D + I Services	1%	1%
Activities related to the sale of fish	23%	30%

Figure 61 shows the distribution of income over the four subsectors in aquaculture, as a percentage of the total income generated in the sector ancillary to aquaculture. Clearly, supplies for the operation generates the most income, with around 50% of the total income generated in this sector. This is mostly explained by the fact that feed, which is included in supplies for the operation, is the dominant service required within aquaculture.

Subsector	Average % (2009)	Average % (2014)
Activities related to servicing of equipment and / or vessels	26%	21%
Supplies for the operation	50%	48%
R + D + I Services	1%	1%
Activities related to the sale of fish	23%	30%

Figure 61. Subsectors in aquaculture, including percentage of total ancillary income

4.3.1 Income in the EU, including segments and subsectors

Due to the limited number of observations, data on ancillary income can only be presented for the sector as a whole and its subsectors for 2014, and not for 2009. Due to missing data on segments (as shown in Figure 60), no reliable estimated could be provided for 2009 and for the individual segments recognised in the aquaculture industry. In practice, data on income was harder to collect than data related to employment, due to the fact that less companies are wiling to provide income data during the field visits, as this is seen as company-sensitive information. Furthermore, consultation of local and national governments as well as local and national registers (via internet, paid and publically available) displayed little results as not in all Member States, companies are obligated to provide this kind of data.

Overall, the total ancillary income is estimated at some 2.8 Billion euros for 2014. Figure 62 displays the distribution of this income over the subsectors, revealing that the supplies for the operation (of which feed is

most important) is the biggest subsector related to income. Almost half of the income of ancillary services in aquaculture is generated via the supplies for the operation.

Subsector	Income (in millions) 2014
Total	**2.831**
Activities related to servicing of equipment and / or vessels	601
Supplies for the operation	1.346
R + D + I Services	36
Activities related to the sale of fish	848

Figure 62. Income in subsectors in the sector ancillary to aquauclture

By combining estimated ancillary income and ancillary employment, the average income per employee can also be calculated. The income in the ancillary sector is roughly 2.8 Billion euro for some 24.638 employees in 2014. This comes down to an average income of 110.000 euro per employee in the ancillary sector. Compared to the figures of marine fishing, which show an income slightly below 100.000 euro per employee, it can be concluded that the added value in the ancillary services to aquaculture seems to be somewhat higher than for marine fishing. An explanation could be that the services offered for aquaculture are more capital intensive and less labour intensive, resulting in higher income per employee generated for the companies working in the sector ancillary to aquaculture compared to the sector ancillary to marine fishing.

4.3.2 Income in Member States, including subsectors

Figure 63 shows the division of income over Member States in 2014, including a geographical map in Figure 64. Data for 2009 is unfortunately not available for the aforementioned reasons and therefore only data related to the year 2014 is presented. Clearly, five Member States are responsible for about two-thirds of the total income generated in the sector ancillary to aquaculture; e.g. Spain, the United Kingdom, France, Italy, and Greece. Overall, the United Kingdom generates the largest amount of income compared to all other Member States, with an estimated income close to half a Billion Euros in 2014.

Member State	Income (in million Euros)	
	2009	2014
Austria	-	7,050 (4,525 - 9,576)
Belgium	-	0,411 (0,264 - 0,558)
Bulgaria	-	28,824 (18,498 - 39,149)
Croatia	-	20,081 (12,887 - 27,274)
Cyprus	-	11,584 (7,434 - 15,734)
Czech Republic	-	70,582 (45,298 - 95,867)
Denmark	-	88,856 (57,025 - 120,686)
Estonia	-	21,544 (13,826 - 29,261)

Member State	Income (in million Euros)	
	2009	2014
Italy	-	330,826 (212,315 - 449,336)
Latvia	-	200,376 (128,596 - 272,156)
Lithuania	-	43,526 (27,934 - 59,118)
Luxemburg	-	N/A (-)
Malta	-	17,138 (10,999 - 23,277)
Netherlands	-	120,367 (77,249 - 163,486)
Poland	-	59,912 (38,45 - 81,374)
Portugal	-	17,382 (11,155 - 23,608)

Member State	Income (in million Euros)	
	2009	2014
Finland	-	7,504 (4,816 - 10,193)
France	-	349,566 (224,342 - 474,79)
Germany	-	112,236 (72,03 - 152,442)
Greece	-	299,779 (192,39 - 407,168)
Hungary	-	41,476 (26,618 - 56,333)
Ireland	-	61,740 (39,623 - 83,856)

Member State	Income (in million Euros)	
	2009	2014
Romania	-	10,823 (6,946 - 14,7)
Slovakia	-	18,098 (11,615 - 24,581)
Slovenia	-	7,771 (4,987 - 10,554)
Spain	-	399,645 (256,482 - 542,808)
Sweden	-	22,058 (14,156 - 29,959)
United Kingdom	-	462,268 (296,671 - 627,864)

Figure 63. Income in the sector ancillary to aquaculture per Member State

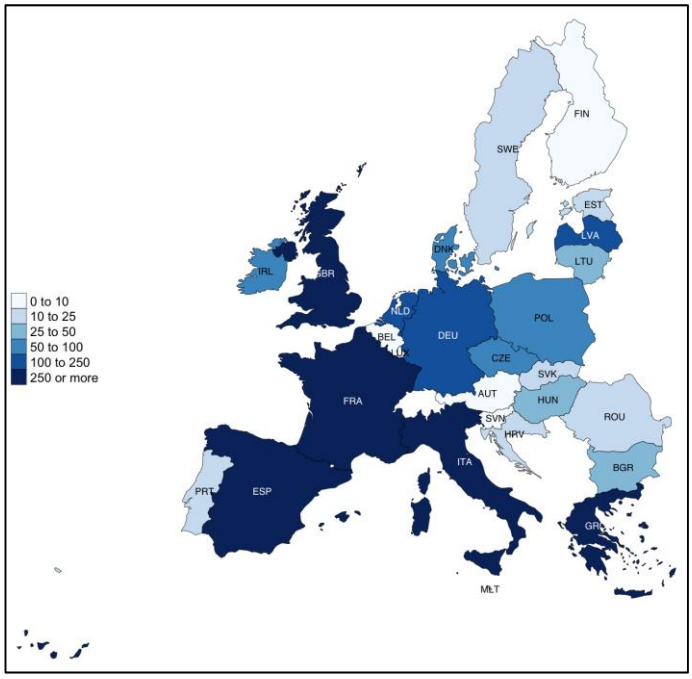


Figure 64. Geographical map of ancillary income in aquaculture in 2014, in million euros

Figure 65 and Figure 66 present the results and what is found in general, is that activities related to the supplies of the operation are most important in the Member States, followed by activities related to the sale of fish. The only Member State in which no ancillary activity is found is Luxemburg, as the production of aquaculture is non-existing in Luxembourg.

Member State	**Total (Million euro)**		Activities related to servicing of equipment and / or vessels		Supplies for the operation		R + D + I Services		Activities related to the sale of fish	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**-**	**2.831,420**	**-**	**601,207**	**-**	**1.346,405**	**-**	**35,537**	**-**	**848,270**
Austria	**-**	**7,050**	-	1,497	-	3,353	-	0,088	-	2,112
Belgium	**-**	**0,411**	-	0,087	-	0,196	-	0,005	-	0,123

Member State	**Total (Million euro)**		Activities related to servicing of equipment and / or vessels		Supplies for the operation		R + D + I Services		Activities related to the sale of fish	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
Bulgaria	**-**	**28,824**	-	6,120	-	13,706	-	0,362	-	8,635
Croatia	**-**	**20,081**	-	4,264	-	9,549	-	0,252	-	6,016
Cyprus	**-**	**11,584**	-	2,460	-	5,508	-	0,145	-	3,470
Czech Republic	**-**	**70,582**	-	14,987	-	33,563	-	0,886	-	21,146
Denmark	**-**	**88,856**	-	18,867	-	42,253	-	1,115	-	26,620
Estonia	**-**	**21,544**	-	4,574	-	10,245	-	0,270	-	6,454
Finland	**-**	**7,504**	-	1,593	-	3,569	-	0,094	-	2,248
France	**-**	**349,566**	-	74,225	-	166,227	-	4,387	-	104,727
Germany	**-**	**112,236**	-	23,832	-	53,371	-	1,409	-	33,625
Greece	**-**	**299,779**	-	63,653	-	142,552	-	3,763	-	89,811
Hungary	**-**	**41,476**	-	8,807	-	19,723	-	0,521	-	12,426
Ireland	**-**	**61,740**	-	13,109	-	29,359	-	0,775	-	18,497
Italy	**-**	**330,826**	-	70,246	-	157,315	-	4,152	-	99,113
Latvia	**-**	**200,376**	-	42,547	-	95,283	-	2,515	-	60,031
Lithuania	**-**	**43,526**	-	9,242	-	20,698	-	0,546	-	13,040
Luxemburg	**-**	N/A	-	N/A	-	N/A	-	N/A	-	N/A
Malta	**-**	**17,138**	-	3,639	-	8,149	-	0,215	-	5,134
Netherlands	**-**	**120,367**	-	25,558	-	57,237	-	1,511	-	36,061
Poland	**-**	**59,912**	-	12,721	-	28,490	-	0,752	-	17,949
Portugal	**-**	**17,382**	-	3,691	-	8,265	-	0,218	-	5,207
Romania	**-**	**10,823**	-	2,298	-	5,147	-	0,136	-	3,242
Slovakia	**-**	**18,098**	-	3,843	-	8,606	-	0,227	-	5,422
Slovenia	**-**	**7,771**	-	1,650	-	3,695	-	0,098	-	2,328
Spain	**-**	**399,645**	-	84,858	-	190,040	-	5,016	-	119,730
Sweden	**-**	**22,058**	-	4,684	-	10,489	-	0,277	-	6,608
United Kingdom	**-**	**462,268**	-	98,155	-	219,819	-	5,802	-	138,492

Figure 65. Income per subsector in the sector ancillary to aquaculture

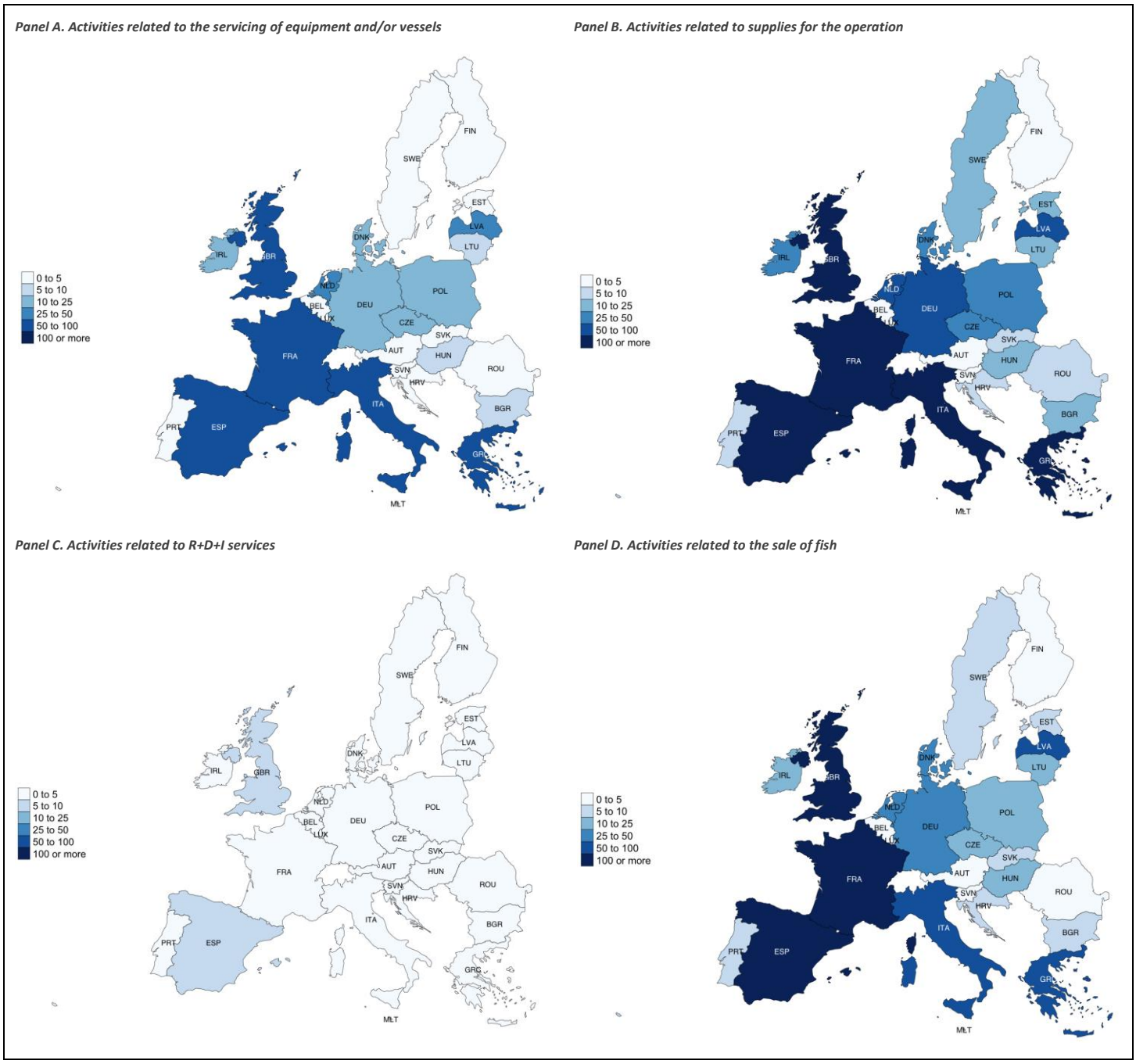


Figure 66. Income per subsector in the sector ancillary to aquaculture in 2014

4.3.3 Regional overview and the contribution of ancillary services to local economies

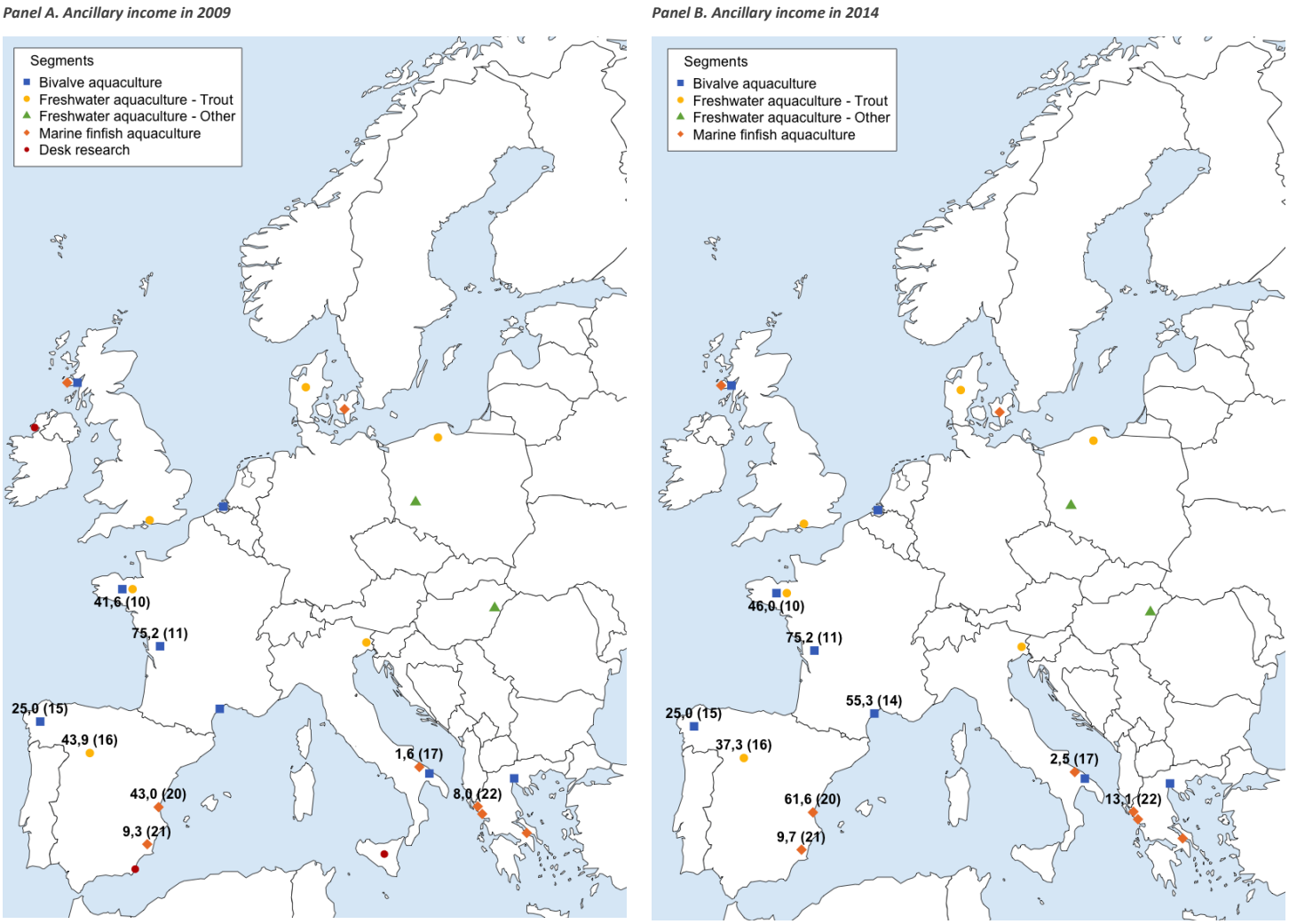
As was explained before, the case studies performed throughout the Europe Union formed the basis for the level of income estimated for the European Union and its Member States. In this paragraph, a regional overview of income data and income multipliers are presented in both table-form (Figure 67) and geographical maps (Figure 68 and Figure 69) that are further complemented by usable findings from the desk research for this study[95].

Figure 68 provides a regional overview of ancillary income for the case studies visited, where each point represents a case study or data collected during desk research. The income figures (in million euros) indicate how much ancillary income is generated in a specific area, and hence the contribution of the ancillary industry to the local economy. When for instance looking at Thresprotia in Greece, the sector ancillary to marine finfish aquaculture is estimated to generate 8,0 million Euros (13,1 million Euros) in 2009 (2014) for this region. Overall, an increase is observed between income levels observed for 2009 and 2014. When looking at Figure 69, presenting income multipliers, it can be concluded that most income multipliers are below zero. Meaning, for each Euro generated in the primary sector, less than one Euro is generated in the sector ancillary to aquaculture. When looking for instance at Galicia in Spain, an income multiplier of 0,22 is found in both 2009 and 2014, indicating that for each Euro generated in the primary bivalve aquaculture sector in Galicia, 0,22 Euro is generated in the sector ancillary to bivalve aquaculture in Galicia. Unfortunately, **Error! Reference source not found.**due to the low number of observations for income multipliers, it is not possible to provide a reliable comparison of income multipliers between segments en geographical areas.

Country	Area	Segment	Ancillary income		Income multiplier	
			2009	2014	2009	2014
France	Bretagne	Bivalve aquaculture	41,600	46,000		0,22
France	Etang-de-thau	Bivalve aquaculture		55,300		
France	Poitou-Charentes	Bivalve aquaculture	75,200	75,200		0,31
Greece	Thesprotia	Marine finfish aquaculture	8,000	13,100	0,13	0,22
Ireland	Killybegs	Desk research			0,46	
Italy	Puglia	Marine finfish aquaculture	1,600	2,500	0,09	
Spain	Carboneras	Desk research			0,28	
Spain	Castilla Leon	Freshwater aquaculture - Trout	43,900	37,300	2,00	2,00
Spain	Galicia	Bivalve aquaculture	25,000	25,000	0,22	0,22
Spain	Murcia	Marine finfish aquaculture	9,300	9,700	0,19	0,13
Spain	Valencia	Marine finfish aquaculture	43,000	61,600	0,81	0,97

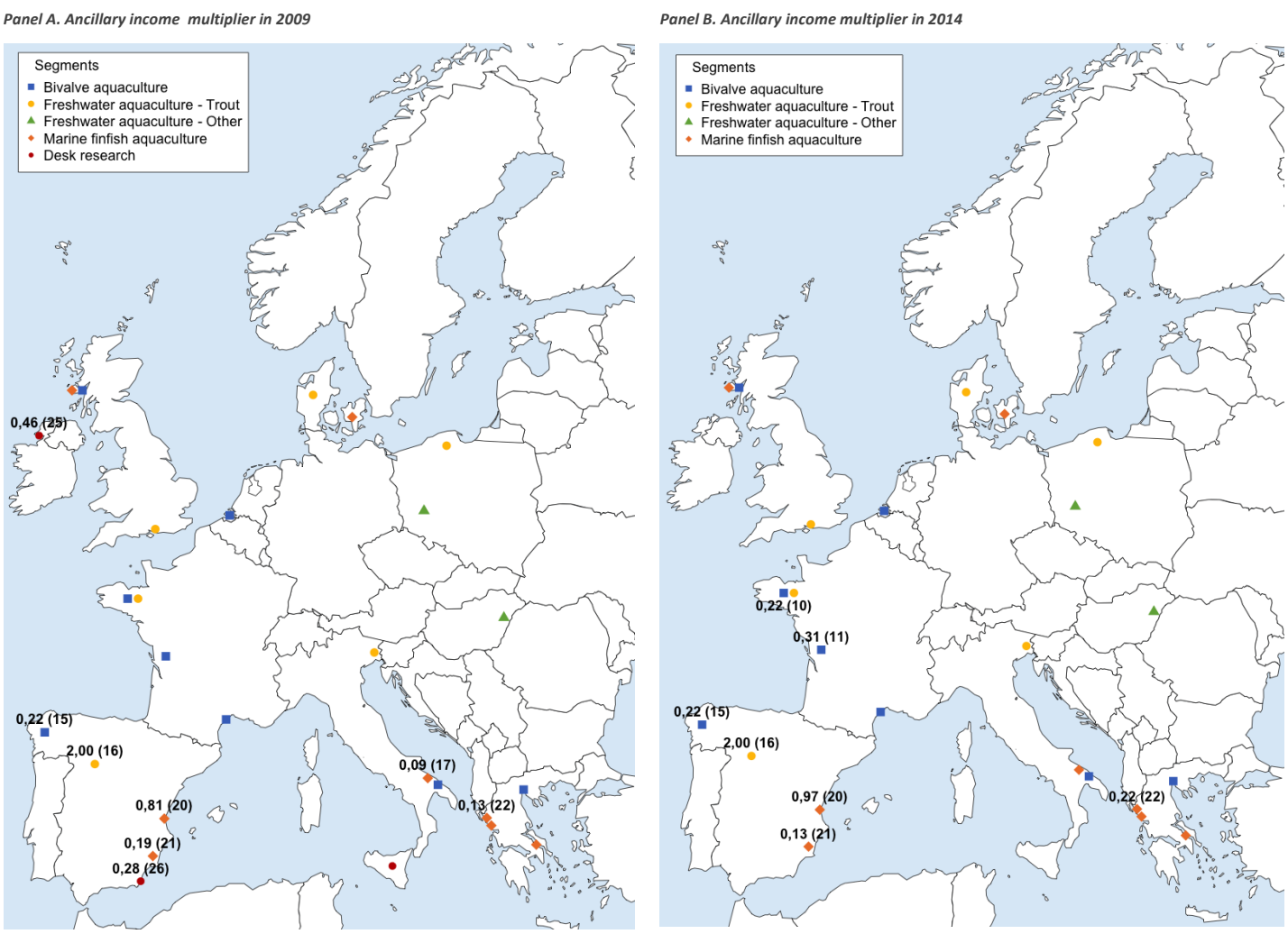
Figure 67. Regional analysis aquaculture – Income

[95] Only those findings of the desk research are taken into account in which a similar definition to ancillary services is provided as in this study, e.g. activities up to the first point of sale.



(1) Isle of Mull, UK (2) Isle of Mull, UK (3) Central Jutland, DK (4) Sjaelland, DK (5) Morenka, PL (6) Hampshire/Wiltshire, UK (7) Zeeland, NL (8) Barycz Valley, PL (9) Bretagne, FR (10) Bretagne, FR (11) Poitou-Charentes, FR (12) Friuli, IT (13) Hajdu-Bihar, HU (14) Etang-de-Thau, FR (15) Galicia, ES (16) Castilla Leon, ES (17) Puglia, IT (18) Puglia, IT (19) Halastra, EL (20) Valencia, ES (21) Murcia, ES (22) Thresprotia, EL (23) Preveza, EL (24) Halkia, EL (25) Killybegs, UK (26) Carboneras, ES (27) Sicily, IT

Figure 68. Regional overview of income (Million euro) in activities ancillary to aquaculture (source: Desk research & Case studies)



(1) Isle of Mull, UK (2) Isle of Mull, UK (3) Central Jutland, DK (4) Sjaelland, DK (5) Morenka, PL (6) Hampshire/Wiltshire, UK (7) Zeeland, NL (8) Barycz Valley, PL (9) Bretagne, FR (10) Bretagne, FR (11) Poitou-Charentes, FR (12) Friuli, IT (13) Hajdu-Bihar, HU (14) Etang-de-Thau, FR (15) Galicia, ES (16) Castilla Leon[96], ES (17) Puglia, IT (18) Puglia, IT (19) Halastra, EL (20) Valencia, ES (21) Murcia, ES (22) Thresprotia, EL (23) Preveza, EL (24) Halkia, EL (25) Killybegs, UK (26) Carboneras, ES (27) Sicily, IT

Figure 69. Regional overview of income multipliers in activities ancillary to aquaculture (source: Desk research & Case studies)

Although ancillary activities are important for (some) local communities in generating income, the Example 4.3 shows that primary production activities are often more important for the local community in providing an income. These production activities can not be transferred to other regions that easily, compared to most ancillary activities.

Example 4.3 Aquaculture in remote areas, example of Isle of Mull, UK

The aquaculture industry is very important for geographically isolated and economically fragile areas in the United Kingdom, such as the Isle of Mull, where two case studies have been conducted during this study. Overall, aquaculture provides years round and stable employment and income in the local communities at the Isle of Mull. Given the geographically restrictions in production facilities, the employment in the primary production sector is almost all created within the local communities the production facilities are based in.

[96] This income multiplier is derived from national registers taking income of different ancillary service providers into account. These registers however do not isolate income with respect to the regions these companies provide services to. Therefore, a percentage of total production was used to calculate regional income, i.e. Castilla Leon produced 12,7% (12%) of total production in marine and freshwater aquaculture in Spain in 2014 (2009), thus 12,7% (12%) of income of the companies is assumed to be income related to services provided in Castilla Leon. Even though, income in the ancillary sector in Castilla Leon may be overestimated, the results do show that the ancillary industry does seem to follow the development in the primary sector. Meaning, a decline in the primary sector most likely also results in a decline in the ancillary sector.

Looking at the activities that are being outsourced to other companies, these services seem to be mostly provided by ancillary companies in other areas in the United Kingdom or even by large multinationals that are located abroad.

4.3.4 Estimates of profits in the ancillary sector

Data on profits was hard to collect during this study. First of all, during the case studies, companies were reluctant to provide data on profits as they feel it is very company sensitive data. Second, local and national governments as well as local and national registers have been consulted, but unfortunately do not collect this data on a structural basis in many Member States. Therefore, only few case studies provided data on profits, and often also only partially. Therefore, in the remainder of this paragraph, the findings related to the profits rates that have been found are based on a relatively limited number of observations. Overall, most services provided in the sector ancillary to aquaculture seem profitable. The level of their profitability however depends on the type of service that is provided. Looking for instance at the provision and production of feed, dealing with increased competition and the supply of fuel, being a commodity good low profit rates averaging around 2 to 4% are observed. On the contrary, higher profit rates have been observed in the provision of technical equipment, where companies show profit rates between 10 and 30%. This is mainly due to the fact that the demand for technical equipment and installations has increased and innovations have emerged in the past few years. This had a positive effect on the profitability of these companies resulting in relatively high profit rates compared to for instance the provision of feed and fuel.

Looking at R+D+I services, these are often provided by Universities or NGO's, which by definition do not show profits.

Finally, it is worth mentioning that with respect to activities related to the sale of fish, profit rates seem to be in the range of 5 to 6%. The same profit rates are observed in activities related to transport of fish. These activities are in general provided by local companies, which make the profits stay in the local communities and are thus important for local communities[97].

Below an example of how the ancillary sector related to aquaculture in Greece in the region of Halkida remained their profitability.

Example 4.4 Profitability of the ancillary sector related to aquaculture, Halkida, Greece

The marine finfish aquaculture sector of Evia is the largest aquaculture production site of Greece. Although the aquaculture companies are distributed in a wide geographic area, they form a hot spot which attracts ancillary service activity from all over the country. Most of the ancillary service providers prefer to establish their companies on the main land side of the area, in order to have easy access to other production areas but also access to industrial support (industrial park of Athens). The ancillary service providers are dependent on Greek aquaculture activity in general and not only from the aquaculture in Halkida. They provide ancillary services to the entire aquaculture industry of Greece. This is the reason behind the profitability of the ancillary sector, which is positive in practically all specific subactivities.

4.3.5 Socio economic data on education, salaries and working experience

Although the majority of the employees in both the primary and ancillary sector has a lower education, the production process within aquaculture becomes more-and-more technologically sophisticated. As a result of the increasing education levels in the primary production process, also the general education level within the ancillary sector has increased over the past years. This general increase in education levels is due to stricter (environmental) regulations which have to be met and the desire to produce in a more efficient way. Consequently, more technological know-how is required for many installations and services related to the production of the supply (e.g. the desire to produce feed most efficiently). A good example which underlines the increasing demand for education is that specialised education targeted towards aquaculture is arising in some countries (e.g. Germany, Greece). In the end, this increases the education level in the ancillary sector related to aquaculture. Another field in which higher education levels are observed is in company management.

[97] Please note that due to the unavailability of data related to profits, no estimates can be provided on the gross value added of the ancillary sector.

Looking at the four subsectors within ancillary aquaculture, differences have been observed. In activities related to servicing of equipment and / or vessels, supplies for the operation and activities related to the sale of fish, mostly people with a lower form of education are employed. Only within management and more technological sophisticated parts of the work, the education level is becoming more important and employs more higher educated people. In R + D + I services, the level of education is almost exclusively higher tertiary education, but this ancillary service only employees a minority of the workforce in the ancillary sector as shown in earlier paragraphs of this chapter.

Looking at working experience in the ancillary sector, most ancillary jobs provide a great starting point for younger people with none to very little working experience. Most services are very specialised and and, not until recently, targeted education was not available. Hence, , education and working experience is often gained on-the-job.

Information on salaries within the ancillary sector follow the general economic rule of compensation. People with higher education in specialised technical jobs have higher remuneration than less educated people in more common jobs. In general, the economic crisis put pressure on salaries paid in the industry, as more people are unemployed and the supply of labour is higher than before the economic crisis. In Greece for example, dealing with high unemployment rates due to the economic crisis, more people are willing and interested to work in aquaculture and ancillary services related to aquaculture for crisis relatively low wage compared to before the crisis. Nevertheless, considering the fact that more-and-more people with a higher form of education are requested to fill the more technical jobs in both the primary and the ancillary industry, an increase in salary levels is expected in these jobs in the future.

4.4 Trends in ancillary aquaculture activities

The primary aquaculture sector (production sector) faced tough times in the years after the economic crisis; from 2009 onwards. In most segments related to aquaculture a recovery has been observed during the past two years. Currently, the primary sector is facing two challenges: i) high mortality rates due to diseases causing a drop in production rates within trout and bivalve aquaculture and ii) environmental constraints to increase production. To cope with these challenges, and to recover from the economic crisis, the *tendency in the aquaculture primary sector is towards market consolidation resulting in larger – vertically integrated – firms*.

These large vertically integrated companies perform more and more ancillary services themselves, **which *decrease the demand for certain ancillary services such as services related to R+D+I services, handling and packaging, distribution and commercialisation services and small maintenance jobs***. These activities are more and more performed by aquaculture companies themselves, causing a reduction in the demand for these type of services. In general, these, mostly small and local, ancillary service providers face a declining demand from the aquaculture sector. Nevertheless, this decline in demand only has a small effect on these local ancillary providers, because in general the aquaculture sector is of minor importance for these smaller locally organised ancillary business. These companies service other sectors (especially in agriculture, construction, marine fishing and recreational fishing) as well, making these ancillary companies more resilient and less dependent on the primary sector related to aquaculture.

While vertical integration in the primary sector decreases the demand for services in the ancillary sector, **it *increases the demand for the the largest ancillary services* related to aquaculture: *the production of feed* and *the supply of technical installations***, where the provision is the predominant service, also in terms of costs for aquaculture companies. Nowadays, ***most of the feed is provided by large internationally operating companies, who benefit from the economies of scale of producing large quantities of feed***. These companies are not bound to a specific region or country and often operate on an international scale. An example of a worldwide operating feed company is BioMar A/S in Denmark, briefly described in Example 4.5. This example underlines some of the major trends in the feed industry.

Example 4.5 BioMar Group, Denmark

The BioMar Group was established in Denmark in 1962 by a group of Danish fish farmers. Today, BioMar is one of the leading suppliers of fish feed for the aquaculture industry. The main business areas are feed for salmon and trout in Norway, the United Kingdom and Chile, feed for trout, eel, sea-bass and sea-bream in Continental Europe, and feed for shrimp and tilapia in South and Central America. On a global scale, the BioMar Group supplies feed to around 60 countries and for more than 30 different fish species, making the BioMar Group the third largest producer of feed to aquaculture in the world.

The BioMar Group employs 904 employees and had a turnover of 1.132 M. euro in 2014. The headquarter of BioMar is located in Aarhus (Denmark) and the production facilities are located in Denmark, Norway, Scotland, France, Spain, Greece, Chile and Costa Rica.

BioMar delivers feed to a wide-variety of different fish aquacultures in many different countries. While these customers have always been of high variety, there are two common developments during the past 10 years.

First of all, BioMar is experiencing that the small-scale customers are being outcompeted by the large-scale customers, i.e. the industry is moving towards fewer, but larger production companies. In general, there is a tendency towards increasing the scale at which companies operate in the aquaculture sector. This also has an impact on the companies providing feed, as they try to follow this development by also increasing the scale of their operations.

The second development is related to the fact that the customers are becoming more expertise-oriented and more professional. This forces BioMar to also become more expertise-oriented and professional when dealing with their customers. This is reflected in the education level of the employees in all regions of BioMar, where the educational level of the employees has increased.

Towards the future, BioMar states that technological innovation will become increasingly important. In fact, it is mentioned in their mission statement and is one of the cornerstones in their business. BioMar also has a department for international development of which innovation plays a big part. Parallel to the need to be more innovative, BioMar hires more employees than ever with a high technical expertise; mostly male, but also female specialists. The reason why innovation plays a key part in BioMar's business strategy is because they have identified that commodities used in the production process, especially fat and protein, will be a limited growth area in their production of feed in the future. Therefore, they are exploring the opportunities of using alternative commodities. Another reason is that by developing new feed to different fish species, they can gain access to new (geographical) markets. For example, the new production facility in Costa Rica that is recently opened, allowed the production of feed for tilapia and was an important step in this ambition of developing new feed to different species.

Another trend in the feed industry is recognised at local companies providing feed. ***Although it is mostly provided by large international companies, the provision of feed by local companies is seen as a diversification activity***, besides the production for the agriculture sector.

Related to the provision of technical equipment - a vital part of the production process of aquaculture companies - the primary industry tends to invest in larger, more technological sophisticated and expensive facilities. ***These technical supplies for the operation are provided by more specialised ancillary companies,*** at which innovation in technical supplies has increased in the past few years. For these larger, specialized companies, export possibilities have increased and not only to other Member States, but also to other parts of the world. ***Specialisation and innovations have led to more export possibilities*** and less dependency on specific regions for these ancillary companies, and hence more resilience of the ancillary sector compared to the primary aquaculture sector.

In general, the trends described above - more specialisation in the supply of technical equipment and economies of scale in the production of feed - apply to all different Member States in which case studies have been conducted. Two success stories are worth mentioning, one example from Italy and a second example from Denmark. These stories of success show that developments in the primary sector, which at first seem to negatively impact the ancillary sector, turned out to increase the resilience of the ancillary sector in the long run. A third example from France (Example 4.8) shows how ancillary companies share their risk and decrease the dependency of a specific region and sector by servicing a long area along the West-Atlantic Coast.

Example 4.6 Traditional freshwater aquaculture in Friuli Venezia, Italy[98]

In the Friuli Venezia area in Italy, there is quite some trout freshwater aquaculture. These aquaculture firms are mostly family-owned and methods are succeeded from generation-to-generation, which makes which make trout aquaculture very traditional. There is little need and interest to invest in new production methods and equipment because the region is still known as a top-producer of freshwater trout. This makes aquaculture firms relatively old-fashioned in terms of technology and the demand for new technologies is low. Ancillary companies have anticipated on this and have expanded their business to other parts of Italy, Europe and even the rest of the world. This makes the ancillary companies in this region less dependent on local freshwater aquaculture in Italy and more resilient to changes in demand from the primary aquaculture sector compared to companies who rely on only one sector or region.

Example 4.7 Effects of Natura 2000 on aquaculture and ancillary activities in Denmark[99]

European regulation (especially the Habitat and Water Framework Directive which is translated in Denmark into) prohibits aquaculture firms to interfere with nature. This European directive is translated in Denmark in Natura 2000, which has quite tight environmental regulations for aquaculture producers compared to the rest of the world. At first glance, this tight regulation could hinder aquaculture production in Denmark and hence the demand for ancillary services related to aquaculture. However, during the case study, it was discovered that other countries are still shaping their regulation, thereby increasing the demand for Danish technological installations related to aquaculture production; the Danish aquaculture production and ancillary services related to the production are already well-prepared for the strict regulations and can meet the demand of aquaculture producers.

As export opportunities increase in the near future - especially considering the African countries that are in search of food sources with high quality protein - primary aquaculture companies are searching for new ways to increase their production within the environmental boundaries set by governments. This increased the demand for new technology and high quality aquaculture installations and materials used for the production of fish. As the Danish ancillary sector for technical installations is well prepared, the outlook for these export products is good.

[98] Information based on case study conducted during this study

[99] Information based on case study conducted during this study

Example 4.8 Ancillary industry in Bretagne, France, shares risk by servicing a larger area

The ancillary industry in Bretagne, along the West-Atalntic Coast, appears to be wuite stable. This industry shares risks and fluctuations through servicing the primary aquaculture sector on a larger area (at least Atlantic coast or even on a national) for the biggest companies (hatcheries; packaging; barges building, et cetera) and/or servicing other sectors such as fishing, agriculture, agro-food industry and the light industry. This makes the ancillary service sector more resilient towards fluctuations than the primary production within aquaculture in this region.

During the case studies, it has also been investigated what the dependency of the ancillary activities in the regions are related to the primary production in aquaculture in that region. In other words, the extent to which ancillary companies are dependent and resilient to changes in the primary aquaculture sector. Figure 70 gives a visual presentation of the results obtained from the case studies and should be seen as an indication on the importance of the primary production sector with respect to the ancillary sector. Overall, large differences have been found between regions; on the one hand regions have been found where the ancillary activities depend to a large extent on the primary aquaculture production, where on the other hand, the dependency on the primary sector is low.

In general, it can be said that there are four types of ancillary services looking at the dependency of aquaculture production in the region. First of all, there are local companies providing smaller technical services related to the maintenance of equipment. These services are however often provided to many sectors (e.g. aquaculture, fishing, agriculture, lighting industry, construction, et cetera), making these companies reliant on the aquaculture sector only to a limited extent.

The second group of ancillary companies are those related to the sale of fish. These services are provided on a local basis and have a relatively high dependency on local aquaculture production.

A third group of ancillary services are the specialised (technical) service providers, such as hatcheries and providers of specialised equipment. This group often serves the national, or even the global market. Their dependence on aquaculture in general, they depend to a large extent on the aquaculture sector, but not on a local basis, since their services are being provided to companies throughout Europe and the rest of the world.

A fourth, and final group, consists of (large) producers of feed. Due to the aforementioned reasons (e.g. economies of scale), more larger companies are active in this sector .In general, these companies are very dependent on aquaculture, albeit not on a local or regional scale but rather on a national or international scale. Nevertheless, most of these large companies have local sales offices, which serve particular geographical markets and are the first point of contact for the local aquaculture companies.

What is interesting is that most feed producers use their local offices as a source of innovation and an export hub. Much like the example provided in Example 4.9 of a feed company in Denmark, feed producers use the local offices to adapt their product to the local conditions and showcase their technologies and overall quality of feed. Hence, although they do not rely on the local aquaculture market for volume, the local market is important from a product development standpoint.

Example 4.9 Danish supplier of feed innovates on local market and uses this as showcase

Aller Aqua A/S is a feed producing company specialised in feed for trout. Their overall market share in feed production for aquaculture in Europe is relatively small (about 3%), due to the fact that Aller Aqua A/S only producing feed for trout. However, when looking exclusively at the production of feed for trout, they are the third largest producer in Europe.

In Denmark, they have about 40% market share, where local offices are being used to showcase the possibilities of the feed they produce given the local conditions and technology.

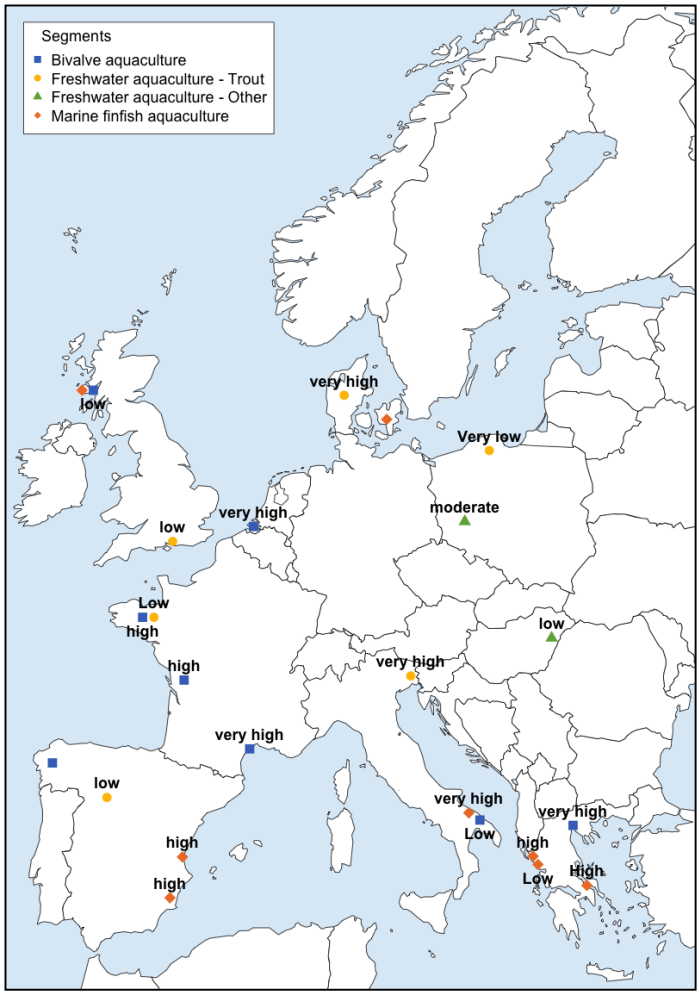


Figure 70. Dependency of the ancillary industry in different regions on the primary aquaculture sector

5 Activities complementary to marine fishing and aquaculture

Chapter 3 and 4 focus on ancillary activities related to marine fishing and aquaculture. In this chapter, the diversification (also called complementary) activities are described. Results are based on desk research and multiple complementary case studies throughout Europe which are used to illustrate some examples.

Many diversification activities seem initiated by the European Fisheries Fund (EFF), under Axis 4, "support for diversification" in which diversification is one of the key themes for the sustainable development of fisheries areas[100]. Fisheries Local Action Groups, or FLAGs, can use Axis 4 to start projects in light of the objectives of Axis 4, and thus in light of the support for diversification in fisheries. Each FLAG is responsible for their own area in the EU (there are more than 300 FLAGs in the EU) and in the end, all their projects should work towards the sustainable development of their areas. FLAGs themselves manage the budget of these projects, where these are executed by a wide variety of local stakeholders.

Looking at activities complementary to fishing and aquaculture, examples of FLAG projects aimed at diversification of fisheries have been found and are presented in Figure 71. Unfortunately, not all projects mention income, employment or other socio-economic data in their achievements. However, based on the projects that do mention employment, it is found that 30 projects have created at least 64 jobs, where most of the projects are still ongoing. The list of projects presented in Figure 71 is also a non-limitative list of projects[101]. Hence, in reality, even more jobs may have been created by these projects and even more will be created in the future by continuation of these projects as well as by the establishment of new projects.

Country	FLAG + Project name	Description	Results	Total project costs
Cyprus (1)	Larnaca and Famagusta FLAG - Festival, campaign and seminars	The Larnaca and Famagusta FLAG in Cyprus wanted to promote fresh seafood and so embarked upon a series of events and promotional activities, reaching thousands of people and encouraging them to eat seafood and learn more about local fisheries and aquaculture.	Results after 18 months: - 7,000 visitors attended the Protaras Fish festival - 400 people took part to the fisheries and aqua-culture seminars - 2 new fish markets opened in the area	- EFF Axis 4: €50,000 - National / Regional co-financing: €50,000 - Other/ Private: €10,000
Denmark (2)	North Jutland FLAG - Fresh fish in the city centre	The Thorup beach fishermen's guild (Thorupstrand Kystfiskerlaug) has converted a traditional fishing boat into a floating fish shop and obtained authorisation to moor it in the heart of Copenhagen. This is giving the fishing guild's products a special entry point to the Danish capital's affluent market and has become a show case for sustainable fisheries.	The results after ten months - Daily fish sales of approximately €1500 per day (sales figures are growing) - 7 new jobs in the storehouse and the boat shop - Additional activity for the guild's processing plant	- EFF Axis 4: €65,000 - National / Regional co-financing: €97,500 - Other/ Private: €557,500
Denmark (3)	West Jutland FLAG - A recreational fishery	This "put and take" fishery offers an easy way for families and friends to experience Danish sea fishing in a safe and accessible environment where, in addition, the catch is guaranteed. This innovative activity has improved the area's tourist offers while creating a new market for local fish via a unique collaboration between a local aquarium, a fishmonger and local fishermen.	Results after 6 months: - Approximately 1,000 visitors between August and December 2013. - New sales channel for professional local fisher- men (who supply live fish) - New customers attracted to the local fishmonger	- EFF Axis 4: €5,000 - National / Regional co-financing: €5,000 - Other/ Private: €16,000

[100] https://webgate.ec.europa.eu/fpfis/cms/farnet/diversification.

[101] Not all FLAGs are equally transparent on their projects. Some only mention the project title on their website, where other only mention finished projects. Hence, even more 'diversifying' projects are expected than those that are presented in Figure 71.

Country	FLAG + Project name	Description	Results	Total project costs
Estonia (4)	Hiiukala FLAG - Diversifying activities and markets	Axis 4 financial support helped a fisherman on the Estonian island of Hiiumaa to diversify his activities outside of the fishing season into the production of fishing gear and multi-purpose nets.	Results after 3 years: - New economic activity launched with products sold on the national market and in Finland - 4.5 new jobs (FTEs) created	- EFF Axis 4: €47,500 - National / Regional co-financing: €15,833 - Other/ Private: €27,141
Estonia (5)	Lake Vortsjarv FLAG - Making life and work attractive	Axis 4 funding in Estonia has contributed to the development of the port of Oiu which has become the first harbour on lake Vortsjarv equipped with all necessary services for fisheries. It is also set to become more attractive for other sectors.	Results after 7 months: - 50 fisherman from all around the lake are now using the infrastructure at this port - 4 new businesses created around the harbour: restaurant, boat construction and fish products workshop, accommodation, sale and rent of boats.	- EFF Axis 4: €77 340 - National / Regional co-financing: €25 780 - Other/ Private: €25 780
Finland (6)	Kainuu Koillismaa FLAG - A video game on fishing	In 2013, the Kitkan Viisas vendace was added to the EU scheme of food products with protected designation of origin (PDO). This special little fish has become a valued and sought after delicacy. It is now also the key character in a web and mobile video game.	Results after 13 months: - Development and launch of new multi-lingual fisheries video game - Approximately 1,300 downloads on Android, in the first month - Approximately 800 players (in 3 languages) on the game's web version in the first month	- EFF Axis 4: €9,200 - Co-financing & match funding: €13,025
Finland (7)	South Finland FLAG - Supporting fishing start-ups for the young	Thanks to the combination of an apprenticeship for young fishers and financial support to improve a local fishing business, 33 year old Tanja from Finland is now a successful fisherwoman, selling her fresh and processed produce directly to consumers.	Results after 18 months: - 1 fishing business maintained and run by a young person - Processing and direct sales activities developed, increasing company turnover by 50% - 2 FTEs created (1 young fisherwoman, plus 2 part- time positions in processing and sales)	- EFF Axis 4: €18,963 - National co-financing: €25,137 - Regional Fishing Union, "Nylands Fiskarförbund" & individual fishermen: €4,900
France (8)	Arcachon FLAG - Experiencing fishing and aquaculture	An inter-municipal body has brought fishermen, shellfish farmers and tourist operators together in the Arcachon basin to valorise and promote fisheries and aquaculture activities and products as a package of new eco-tourism offers that are also being used to help brand the area's identity.	Results after 5 years: - Quality charter developed for pesca-tourism - 11 fishermen and 14 oyster producers have diversified their activity into tourism - 1,400 tourists undertook pesca-tourism from 2010 to 2013 and 1,159 in 2014	- EFF Axis 4: €17,715 - National co-financing: €3,970 - Regional co-financing: €7,069 - Local public match-funding (SIBA) €10,809

Country	FLAG + Project name	Description	Results	Total project costs
France (9)	Var FLAG - Restricted fishing area	Fishermen, local authorities and scientists have been brought together by a local NGO to build the first steps of a future effective and sustainable management plan to enforce conservation measures in a restricted fishing area on France's Côte d'Azur.	Results after 1 year: - Over 112 surveillance operations carried out - 7 fishermen mobilised and compensated financially for surveillance activities (a total of 1 FTE) - Improved status of the local environmental re-source - Strengthened role of the Prud'homie in managing the local fisheries resource.	- EFF Axis 4: €52,856 - National co-financing: €43,217 - Region & Province: €46,000
Germany (10)	Aischgrunder Karpfen FLAG - Guided tours by carp experts	The Aischgrund Carp Region in Germany used Axis 4 to bring together around 1 000 carp producers in a concerted effort to develop and promote carp tourism in the area. An info point was set up, packages of activities organised and 50 "carp guides" were trained.	Results after 4 months: - Info point set up to promote carp tourism (creating 2 full-time jobs) - 50 carp guides trained, including carp farmers - Increased carp tourism in the area and consumer awareness of the "Aischgründer Carp" as a registered PGI trademark - Increased revenue in the restaurants with the quality label "Aischgründer Carp Kitchen".	- EFF Axis 4: €82,008 - National/Regionalco-financing:€82,008 - Other/ Private: €41,004
Germany (11)	Oberlausitz FLAG - Creating Image Awareness	By focusing on organic aquaculture and jazzing up the image of carp, the German region of Upper Lusatia is changing consumption habits and improving awareness of carp products among younger generations.	Results after 22 months: - Carp producers moved from conventional to organic carp production - 1 job created - Organic carp products now stocked in German organic food shops	- EFF Axis 4: €124 221 - National / Regional co-financing: €41 407
Greece (12)	Dodecanese FLAG - Diversifying into the restaurant business	A small-scale Greek fisherman set up a restaurant to complement his revenue during the summer months and serve his freshly caught fish.	Results after 12 months: - New "0 km" restaurant and economic activity created - 35% increase in annual revenue (70% increase during summer months) - 3 seasonal jobs created	- EFF Axis 4: €26,327 - National / Regional co-financing: €10,238.16 - Other/ Private: €24,376.57
Greece (13)	Thessaloniki FLAG - New markets for live and processed seafood	FLAG financial support in Greece facilitated the creation of Blue Crab P.C., a seafood conditioning and processing enterprise which processes a variety of fish, crustaceans and shellfish on a newly constructed and equipped site in the town of Chalastra.	Results after 18 months: - Market for live blue crabs developed in 7 countries (GR, ES, IT, FR, BE, DE and CZ) - 3 jobs created - Turnover of approximately €250,000 in the first full year of operations	- EFF Axis 4: €203,299.20 - National / Regional co-financing: €67,766.40 - Other/ Private: €180,710.40

Country	FLAG + Project name	Description	Results	Total project costs
Ireland (14)	North West FLAG - Sustainability of life on a small island	FLAG investment in reinstating a slipway has helped enable the owner to remain on his Irish island base in Clew Bay and make his way of life more sustainable for him and his family.	Results after 12 months: - 1 full-time job maintained - 3 new services developed – repairs, repainting and hull cleaning - 6 vessels used the service developed in 2014 - Additional revenue of €4,950 has been generated as a result of the project in first full operational year	- EFF Axis 4: €1,517 - National / Regional co-financing: €1,517 - Other/ Private: €4,552
Italy (15)	Terre di Mare FLAG - Fish from the boat & home delivery	The family fishing company, Facchini Pesca, was suffering from the poor prices it was fetching at the local wholesale auction. The project consisted of equipping the family boat to be able to sell their fish directly to the consumer while respecting health & safety rules and equipping their van to be able to transport fish in refrigerated conditions.	The results after ten months: - 60 households as regular customers - 4 restaurants as regular customers - 30-35% increase in sales revenues	- Own financing: €42 000 - EFF Axis 4: animation and project development support
Poland (16)	Slowinska FLAG - Supporting fishing & new boating activities	FLAG support to a local entrepreneur in the Polish fishing town of Ustka has created jobs, facilitated the work of local fishermen and helped them diversify their activities into tourism.	Results after 8 months: - 6 jobs safeguarded in the existing SME - 3 new jobs created, including 1 for a former fisherman - 8 customers serviced in the boat repair workshop	- EFF Axis 4: €64,770 - National / Regional co-financing: €21,590 - Other/ Private: €63,750
Portugal (17)	Alem Tejo FLAG - Short circuits and sustainability	Through the development of an innovative short supply chain delivery system of local seafood, Axis 4 has helped a Portuguese company to bridge the gap between customers and small-scale fishermen, whilst also encouraging sustainable fishing practices in the Sesimbra area.	Results after 3 years: - 40 fishermen involved, 3 working exclusively for the scheme - Tripled volume of fish sold by the company (40 tonnes sold in 2013) - 3 jobs created in Sesimbra harbour	- EFF Axis 4: €5,022 - National/Regionalco-financing:€5,021.85 - Other/ Private: €15,066.15
Portugal (18)	Litoral Norte FLAG - Successful product placement	Thanks to Axis 4, Vianapesca, a Producer Organisation of small-scale and medium-sized fleet operators from Northern Portugal, developed a marketing campaign to promote traditional seafood at national and European level.	Results after 2 years: - 13 canned fish products rebranded - 1 new company created in Lisbon - 4 permanent and approximately 20 seasonal jobs created - Additional income of €30,000 in year 1 of operations, estimated to double in year 2.	- EFF Axis 4: €104,611 - National / Regional co-financing: €34,870.50 - Other/ Private: €50,000
Portugal (19)	Sotavento FLAG - Servicing shellfish production	Nuno Russo comes from a family of Portuguese shellfish producers in Ria Formosa, Algarve. Axis 4 has enabled him and his family to diversify their business and develop a new service for their fellow producers.	Results after 4 months: - 1 new service created and operational - 2 full-time jobs maintained - 6 clients secured	- EFF Axis 4: €28 020 - National / Regional co-financing: €9 340 - Other/ Private: €24 908

Country	FLAG + Project name	Description	Results	Total project costs
Romania (20)	Tulcea FLAG - Accommodation in a fishing family's home	Ecaterina Epifan, a fisherman´s wife, set up accommodation facilities to complement her revenue and to attract more tourists to the Romanian fishing village of Mila 23.	Results after 1 year: - 2 new jobs created - 1,000-1,500 clients per year	- EFF Axis 4: €97,821.10 - National / Regional co-financing: €32,607.03 - Other/ Private: €86,952.08
Spain (21)	Cadiz Estrecho FLAG - Packaging tourism assets	Over 100 local companies (fishing and processing companies, restaurants, tourist operators...) as well as two natural parks have been brought together to build a series of different tourist packages along the coast of the Cadiz Straights in Spain.	Results after 2 years: - 100 companies mobilised - 5 new products created - 4 jobs created - More than €200,000 generated	- EFF Axis 4: €291,929.50 - National / Regional co-financing: €97,309.83 - Other/ Private: €20,000
Spain (22)	Costa da Morte FLAG - Online sales	The Costa da Morte FLAG from Spain brought together nine Cofradías (fishermen's associations), involving more than 500 Galician fishermen and shellfish producers, to develop and pilot an online sales platform.	Results after 2.5 years: - Online sales platform developed and piloted - 15% increase in prices of certain species - 8 tonnes of fish sold in the first year, generating €25 000	- EFF Axis 4: €40,828 - National / Regional co-financing: €18,343 - Other/ Private: in kind
Spain (23)	Delta del Ebro FLAG - Commitments from local restaurants	"Peix de llotja", translated literally as "fish from the auction", has brought local fishing organisations together in Spain to promote their production to local restaurants. The project developed a brand and awards stars to restaurants that commit to buying their fish directly from their local auction.	Results after 22 months: - Cooperation developed within the fisheries sector and between the fisheries, tourism and catering sectors -13 restaurants buying directly at local fish auctions - 10-15% increase in auction prices of those species typically purchased by restaurants	- EFF Axis 4: €8,155 - National / Regional co-financing: €8,155 - Other/ Private: €7,615
Spain (24)	La Sidra - Sport fishing and handicraft shop	FLAG technical assistance and financial support from Spain helped two net menders in Asturias to diversify their traditional activities of net mending and tap into new markets (training and tourism).	Results after 7 months: - 300 clients over the summer and a further 120 for the remaining 4 months - 400 tourists for the guided tours - 17 people attending the net mending training	- EFF Axis 4: €6 701.43 - National / Regional co-financing: €2 233.81 - Other/ Private: €8 549.76
Spain (25)	Marina - Ortegal FLAG - Artisanal canning and processing	Three women from Spain set up their own company in Galicia selling local fish and seafood in artisanal canning.	Results after 2 years: - New company set up by 3 women over 45 years old, 2 of which were unemployed - 2.5 new jobs created - Turnover obtained in first full operational year: €65,000 - New contract signed to export their canned products to Mexico	- EFF Axis 4: €23,909 - National / Regional co-financing: €7,965.26 - Other/ Private: €21,291.41

Country	FLAG + Project name	Description	Results	Total project costs
Spain (26)	Navia-Porcia FLAG - Guided tours and education	A cofradía (fishermen's organisation) from Spain's Asturias has worked to increase the touristic and cultural value of the local fisheries sector by equipping the local auction house for guided tours and educational activities.	Results after 6 months: - A total of 600 visitors during summer (July-August) - €4,000 of income generated - Around 25% of the visitors are children.	- EFF Axis 4: €101,550 - National / regional co-financing: €33,850
Sweden (27)	Blekinge FLAG - Certifying sustainability	"Increasing value without increasing captures" has been the motto of Sweden's Blekinge FLAG. To achieve this goal, it worked on a comprehensive package of activities for local fishermen, including support to gain certification for the sustainability of their fish.	Results after 2.5 years: - 1 fisherman certified for KRAV sustainability scheme for cod. - KRAV application submitted for pike and perch. - 20-25% increase in profitability for KRAV certified catch.	- EFF Axis 4: €36,305.34 - National co-financing: €36,305.34
Sweden (28)	South Baltic FLAG - A town where fishermen live, work and hope	Simrishamn is a picturesque coastal town in southern Sweden with a rich fishing past. However, the local fishing sector had dwindled since the 1980s following several crises. Fishermen had lost their voice and visibility in the area but Axis 4 has helped to reinstate their civic position and, attract visitors to the town.	Results after 3 years: - An estimated 14,000 people attracted to the Home Harbour event - Increased income for participating fishermen during the festival (approximately €165 per day) - Increased public interest and NGO involvement in local fishing sector - An identified potential market for traditionally "non-marketable" species (value change from €0 to €4/kg)	- EFF Axis 4: €37,500 - National / Regional co-financing: €37,500
United Kingdom (29)	Dumfries and Galloway - Crowd funding community infrastructure	Annan Harbour Action Group in Scotland have successfully used 'crowd funding' to provide vital private sector co-finance for a FLAG supported restoration project.	Results after 3 months: - €7,624 raised through the 'Crowd' in 56 days - Contributions from 45 backers.	- EFF Axis 4: €14,290 - Regional co-financing: €14,290 - Regional match funding: €13,087 - Crowd funding and in-kind contribution: €13,340
United Kingdom (30)	Northern Devon FLAG - Connecting the Fisheries Sector	A combination of one-to-one engagement with local businesses and English fisheries, networking them with each other and the provision of business mentoring support has increased the supply of local fish into the Northern Devon market.	Results after 16 months: - 2 part-time jobs (1FTE) and 2 seasonal jobs created - 2 full-time jobs maintained - 3 new companies created - 4 new products developed	- EFF Axis 4: €57,100 - National / Regional co-financing: €44,955.00 - Other/ Private: €38,080

(1) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_19.pdf

(2) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_2.pdf

(3) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_24.pdf

(4) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_29.pdf

(5) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_33.pdf

(6) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_22.pdf

(7) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_37.pdf

(8) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_23.pdf

(9) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_13.pdf

Country	FLAG + Project name	Description	Results	Total project costs

(10) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_25.pdf

(11) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_10.pdf

(12) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_26.pdf

(13) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_7.pdf

(14) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_34.pdf

(15) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_1.pdf

(16) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_31.pdf

(17) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_5.pdf

(18) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_11.pdf

(19) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_32.pdf

(20) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_27.pdf

(21) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_28.pdf

(22) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_3.pdf

(23) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_4.pdf

(24) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_30.pdf

(25) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_8.pdf

(26) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_18.pdf

(27) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_16.pdf

(28) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_35.pdf

(29) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_36.pdf

(30) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Farnet_Pan2020_21.pdf

Figure 71. List of FLAG projects - Complementary activities

Unfortunately, unlike ancillary activities, not much information is found on socio-economic data such as age, gender, education level et cetera. The link to (former) fishermen is hard to find. The next step was to search databases and registers for data on the number of (former) fishermen and fish farmers now active in other sectors by means of diversification. The search for this kind of data was complicated by the fact that data seems to be incorporated in data that is aggregated on a higher level, such as tourism. Little has been found which document and support numbers or socio-economic data and characteristics. As a final step to gather data, specific case studies on complementary activities in Europe have been conducted to gather information.

5.1 Complementary activities related to aquaculture

Looking at the complementary services provided by aquaculture companies, it must be noted that these activities are often not professionally organised or organised to generate significant income from these activities, but more for awareness raising around the aquaculture activity and to make people aware of the quality of the product (for instance in the United Kingdom and the Netherlands in the form of tasting events). In the end, the overall economic importance of complementary activities in aquaculture is limited, with mostly only those who are already involved in the primary production, being employed in this sector[102]. In terms of income, activities only seem to generate some additional income, albeit marginally. Finally, it must be noted that there does seem to be an increasing trend towards the establishment of restaurants, shops and gastronomy activities related to aquaculture. Especially in Poland, gastronomy is increasingly offered by aquaculture firms, providing employment opportunities for women in this sector (although these are not former fishermen of fish farmers but in some cases the wives of fishermen or fish farmers). Furthermore, bivalve aquaculture seems to well-suited for complementary activities (e.g. shops, restaurants, visits, tastings, et cetera), with significant activity in for instance France and the Netherlands.

102 These employees are therefore also included in the Data Collection Framework of the European Commission

5.2 Complementary activities related to marine fishing

Complementary activities related to marine fishing are slowly growing, but still of minor importance compared to the economic importance of marine fishing, processing and ancillary services. FLAGs seem to initiate and support most of the diversification opportunities in the regions. Most activities in marine fishing are related to fishing – or boat – trips for tourists, undertaken by small fishermen to generate additional income. Although these activities seem to increase, it is difficult to quantify as data is not widely collected by local associations as well as governmental organisations. Furthermore, it is very difficult to determine which of these activities are performed by (ex)fishermen and which are performed by dedicated companies. Finally, the increase is characterised as a slow increase due to (perceived) regulatory constraints in Member States. These mainly come down to the following:

- In Greece, fishermen lose their fishing license if the income from other activities is more than 50% of their total income. To avoid this risk, no complementary activities are undertaken.
- In Italy, there is a lack of regulations and supporting measures for fishermen to engage in complementary activities.
- In Spain, there are many administrative problems with carrying tourist on board and insurance issues if fishermen want to take tourists on board of their vessels.
- In the Netherlands, regulations put restrictions on equipment, vessels and personnel due to safety measures for tourists. For larger groups (more than 8 tourist) a special license is required.

Regulation seems to be the biggest constraint in developing complementary activities in marine fishing. Fishermen have to comply with a multitude of rules to ensure the safety of tourists on board of vessels. Where this requires getting additional licenses looking at the fishermen (which are often expensive), it also requires significant changes – and thus investments – to the vessels to accommodate passengers (e.g. seating, toilets, safety equipment, et cetera). Hence, in practice, when guided tours are being offered, these are mostly offered on specialised touristic vessels on which the involvement of former fishermen is limited. What must be noted is that in regions where the local government has made significant efforts in promoting and stimulating complementary activities – for instance by providing funding and favourable legislation – complementary activities have grown and significant activity complementary sector is found[103]; for instance, in some regions in Italy and in Catalonia in Spain[104].

Although absolute numbers are hard to find, during the case studies for some specific case the interaction of fishers with other sector is clear found and developed over the past years. Below some examples from different Member States in which fishermen and fish farmers found opportunities to engage in.

Oil and Gas industry in Fraserburgh

Fishing remains at the heart of the Fraserburgh economy, but employment in (and income from) the oil and gas sector is now a close second in influence on the local economy. A significant number of fishermen have moved to work within the "offshore" oil and gas sector (more than 100 over the past five years). Typically this means that they man standby vessels (often current or former fishing vessels) that are stationed nearby oil and gas installations and pipelines to ensure that safety exclusion zones are adhered to by marine traffic and fishing vessels. (former) Fishermen are perfectly equipped for the job as they know the area very well.

This has, however, greatly challenged and tested the underlying conservatism of the area, which, together with periods of very high earnings, has created many social stresses within the community. Employment opportunities differ which increasing the income inequality in the local community. For the fishing community it means that parts of the fleet have become very dependent on recruitment of foreign nationals as crew – most notably of Filipinos.

Because the pattern of work in the oil and gas protection, for example 3 weeks on 1 week off, many ex fishermen go fishing – either retaining a commercial license and a small potting vessel, or joining others on a part-time basis. This pattern of activity can be a source of friction with those engaged full-time in the industry (though an even greater source of friction is the fair-weather and hobby fishermen who become active across

[103] What must be noted that the overall economic importance is still limited with little income and employemt, compared to the fishing industry, processing and the ancillary sector.

[104] In Catalonia, fishing companies seem to generate an additional 5 to 8% income from complementary activities.

the summer months, flood the market with product, and are less discerning about the quality of (for example) crab and lobster that they land and sell).

The recent sharp drop in oil prices will undoubtedly effect the Fraserburgh community, as less people are needed on the platforms. These layoffs will undoubtedly impact negatively on the Fraserburgh economy, but may not have as great an effect on the former fishermen that have moved to protection services, as this area of work will be largely unaffected by the current retrenchment – all offshore facilities will still need to be protected.

Little complementary activities in Andalucia

Local experts in Andalucia explain that complementary activities have not been widely developed in Andalucía, due to a combination of factors. First of all, there is a reluctance and a lack of willingness among fishermen and managers of Cofradias to engage in these kind of activities. The main explanation of this seems to be related to the fact that fishermen are reluctant to allow tourists on their premises and that the potential income generated from these activities is limited due to limited interest of tourists and locals for these activities.

Secondly, fishermen cannot allow tourist on board of their vessels due to administrative problems and insurance coverage. In the end, the safety measures on vessels and the licenses of fishermen do not allow fishermen to take tourists on board. What must be noted is that the Central Government is currently drafting regulation to address these issues at a national level (some regions have regulation in place, see the example of Girona Coast, but Andalucia has not in the opinion of fishermen). This new regulation is planned to be finalised in 2016 and experts expect an increase in initiatives related to pesca tourism as soon as this regulation is implemented. The extent to which these initiatives will be a success, will, in the end, depend on the willingness of these fishermen to open their premises to tourists and locals.

Pesca tourism in Puglia

In recent years in Puglia (Italy) fishing tourism is growing and developing rapidly, providing opportunities for the diversification of fishing activities. The fishing touristic offer, ranges from short trips along the coast, the observation of commercial fishing activity and the ability to carry out activities of sport fishing, until the on-board food service, also including all those activities that create awareness and appreciation for the coastal environment that can serve to bring the public closer to the world of professional fishing. It is estimated that some 40 companies are active in pesca tourism in Puglia, providing employment of some 120 FTE. Fishing tourism is a complementary activity to small-scale fisheries which give the operators the possibility of taking people on board, usual fishing vessels for touristic-recreational activities with a view to promoting and disseminating the maritime and the fishing culture.

Although complementary activities are growing in Puglia, the grow is still characterised as slowly probably due to the lack of experience of fishermen who have turned themselves into tourist operators offering services whose quality does not meet tourists' expectation (e.g. fishing tours are not well organised due to a lack of experience). Fishermen are not used to have visitors on board. Another factor hindering the growth of complementary activities is the lack of a regional regulation and of measures to support the start-up of fishing tourism business. Regione Puglia is trying to bridge this gap by approving a "Regulation on fishing tourism and ichthyo-tourism" which aims to implement the multifunctional role of the fishing enterprise, to foster local entrepreneurship's initiatives by favouring the renewal of generations and increasing employment, but also to guarantee the administrative simplification for business start-up, to eliminate duplicates and harmonise the sector rules.

Regional authorities are also planning to promote recreational activities through the European Fisheries Fund, EFF. Accordingly, 1.970.000 Euros have been allocated to FLAG Italy – Jonico Salentino (the FLAG area covers four municipalities on the Ionian coast of Salento: Gallipoli, Galatone, Nardo and Porto Cesareo). The FLAG strategy is focused on the implementation of a local development strategy.

Gastronomy related to aquaculture in Morenka

In the Morenka area there a some larger aquacultural firms active. Besides the production of fish, other sources of income is developing during the past years. Gastronomy and smokers are developing at

aquaculture firms. Gastronomy is often practiced by women, offering accommodations as meeting rooms for businesses and meals based on the species produced at the aquacultural farm. In smokers male are mostly active. Both activities provide another source of income for aquaculture farmers, but not a primary sources of income. Not all firms in the area offer these kind of complementary activities, especially in the field of trout aquaculture, as this is a very sensitive fish for diseases and if one fish is affected the whole population is worthless. Therefore, some producers do not allow any strangers at their production sites.

Pesca tourism at Girona Coast

In Catalonia, there is a substantial offer for tourists looking for a marine, maritime or fishing experience. The offer is indeed nothing new but very well established in certain communities. In 2012, with the publication of the Decree 87/2012, the support of Generalitat de Catalunya for the management of complementary activities to fishing and aquaculture became explicit in legal terms. The number of communications launching new complementary activities as defined in the Decree have been increasing since 2012. Since then, different legal entities in Catalonia have asked for permission to perform a total of 77 complementary activities to fishing and aquaculture, using vessels, installations in ports and other facilities. The official databases show that there are 6 fisheries centre of tourism in Spain, 4 located in Girona province. Also, 5 aquaculture centres of tourism provide complementary services related to mussels farming and one more to Bluefin tuna fatting, all of them in Tarragona province. With these figures the total size of pesca-tourism with respect to the primary sector may exceed 5% of the whole fishing fleet in Catalonia (this percentage is obtained by dividing 50 fishing vessels (potential size of pescatourists in Catalonia) by the number of vessels (915) in Catalonia, having a proximity of complementary activities by the potential pescatourists.

There is a positive trend in demand for complementary services in Catalonia, mainly due to the demand of tourists for these services. The publication of the Decree 87/2012 has clarified legal uncertainties related to insurance coverage and maritime rules, which also increase the supply of complementary services. Moreover, this regulation will have positive consequences in other autonomous communities where the activities are currently almost inexistence.

There are currently two limiting factors affecting the quicker development of complementary services: weather conditions and the need to speak other languages (especially English and French). In 2015 in Roses, 80% of the requests to perform pesca-touristic tours were cancelled for safety reasons. Safety regulations is on ongoing topic in legislative negations with governmental institutions. The need to speak in other languages (English, French) is a fact and thus the personnel engaged in complementary services must count on these skills to perform the activity accordingly, but is an obstacle for the majority of fishermen to engage in these activities. Fishermen noticed that they have a gap with other languages and wanted to ask for special training to the regional authorities. The need also covers communication and marketing skills.

5.3 Summary of findings

The main difference between complementary activities in aquaculture and marine fishing is related to the fact that aquaculture companies tend to organise these activities themselves, while in marine fishing, these activities are for a large deal organised by other companies (with sometimes the active participation of former fishermen). The reason for this is quite straight forward; given the nature of complementary activities in aquaculture (e.g. site visits, guided tours, recreational fishing [105], tastings, restaurants, smokers, accommodations and shops), the aquaculture companies are the most logical provider of these activities, since these mostly take place on the premises of aquaculture companies. Moreover, given the sensitive nature of production sites, aquaculture companies are reluctant to open their premises to external companies.

All in all, it can be concluded that complementary activities are of minor importance in terms of employment and income for both marine fishing and aquaculture, where more complementary activities have been observed in marine fishing compared to aquaculture. Finally, in general, it should be noted that many fishermen and fish farmers have indicated that they have little interest to develop complementary activities. Fishermen and fish farmers are mainly focused on their primary process and are not interested in offering services that involves significant investments and can only be offered during certain periods of the year. In addition, local experts in for instance Spain and France explain that the interest from tourists related to these

105 This is especially a popular activity in trout aquaculture on freshwater lakes.

kind of activities is limited. In the end, this makes the complementary sector – in their opinion – a relatively unattractive sector to invest in and fishermen and fish farmers rather devote their resources to more profitable and rewarding activities; i.e. their core business.

Complementary activities have future potential. Especially complementary activities related to tourism can be further stimulated by for example EMFF subsidies. Work and income opportunities for women arise, and these complementary activities related to fishing provide more income and employment in other (touristic) sectors as well. Examples are ice fishing, although a marginal activity in terms of income and employment generated, it is important to attract tourists. Same applies for complementary activities in for example France, where gastronomy in ports attracts many tourists to certain regions.

6 Other fishing related sectors

In this Chapter the results of the other sectors in scope of this study (e.g. inland fishing, ice fishing, the seaweeds industry and shellfish gathering) are presented.

6.1 Inland fishing

The results in this paragraph are based on desk research and five case studies throughout Europe. Research reveals that there is a large similarity between inland fishing and ice fishing. Although methods used in inland fishing and ice fishing might differ, the same fishermen partake in both type of activities, fishing on the same lakes on the same species. When the lake is covered with ice it is ice fishing, when the lakes are not froze it is inland fishing.

Commercial inland fishing forms a small part of the total European fishing industry in terms of catch volumes, value and to a lesser degree employment. The inland fishing industry has been in decline since the 1980's. Commercial inland fishing is done in 22 of the 28 EU Member States, but the size of the industry is significant in only 19 Member States[106]. There are between 14.000 and 15.000 vessels operating in the commercial inland fisheries (these inland fishing vessels are not part of EU fishing fleet, but would be equivalent to approximately 14% of the total EU fishing fleet) and there are approximately 1.000 fishermen operating without a vessel[107].

Total inland catch volumes are estimated at 35.000 tons (1% of the total production of EU fishery products) and the total catch value is 100 to 110 million euros (1% to 2% of the total value of EU landings)(Figure 72).[108]

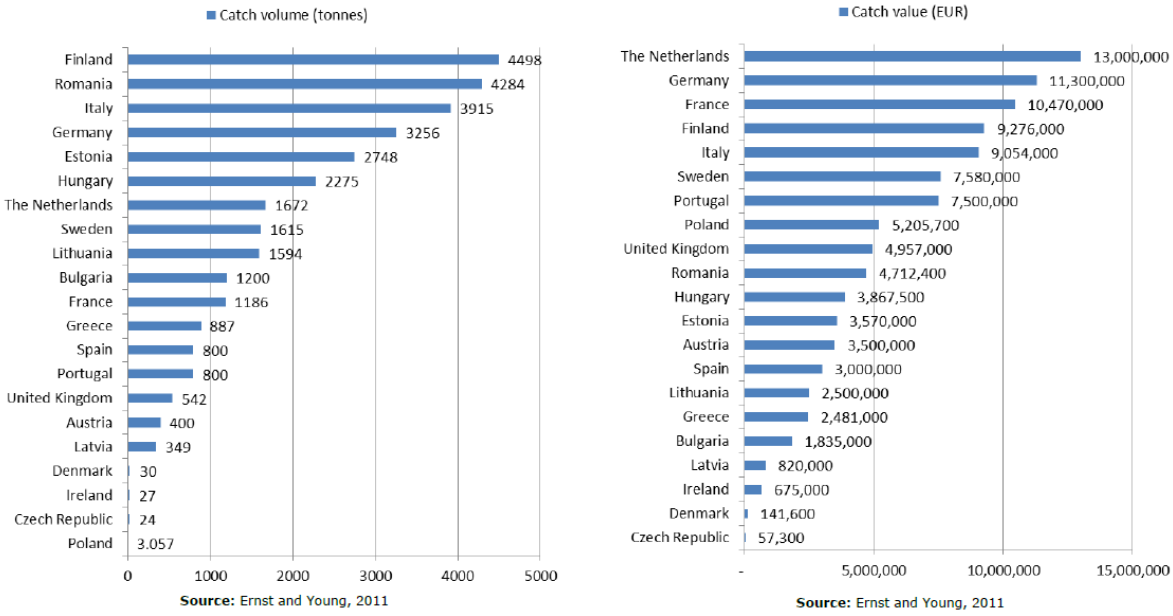


Figure 72. Catch volumes and catch value in commercial inland fisheries in the EU

Looking at employment, there are approximately 17.100 (this would be equivalent to approximately 13% of total number of fishermen in Europe) commercial inland fishermen operating within the EU. The employment statistics for inland commercial fisheries are reported to be unreliable with many working part-time with traditional fishing methods. Most inland fisheries supply local traditional demand and niche markets often have cultural value for local communities. Furthermore, professional inland fishermen are frequently involved in

106 Significant is considered 100 fishermen or more

107 http://www.europarl.europa.eu/RegData/etudes/note/join/2014/514001/IPOL-PECH_NT%282014%29514001_EN.pdf

108 http://www.europarl.europa.eu/RegData/etudes/note/join/2014/514001/IPOL-PECH_NT%282014%29514001_EN.pdf

environmental monitoring and management because of their knowledge of local conditions[109, 110]. Figure 73 presents the employment in commercial inland fisheries by Member State.

Member State	Total	Full-time	Part-time	Occasional (1)	FTE
Total	**17.094**	**5.051**	**5.592**	**495**	
Austria	100	20	80		
Bulgaria(5)	1.500	630	870		717
Czech Republic	4		4		
Denmark (5)	19	10	9		
Estonia	963				
Finland	945	313	338	294	478
France (5)	431	242	189		306
Germany (5)	932	437	495		
Greece (2)	400	50	350		
Hungary	304	204	100		
Ireland	624		624		60
Italy (3)	3.600				
Latvia	231	40	191		
Lithuania	300				
Poland (5)	755	475	280		
Portugal (4)(5)	940	188	564	188	
Romania	2.677	2.422	242	13	2.545
Spain	500				
Sweden	193				
The Netherlands	400				
United Kingdom	1.276	20	1.256		298

(1) Only some hours/year and sometimes no fishing

(2) Greek lagoons are not taken into account as they are not considered as fishery areas (extensive aquaculture).

(3) The number of fishermen in Italy includes 2.600 operating in coastal inland lagoons (brackish) and generally having other activities (shellfish, rearing, sea fishing, …).

(4) Rio Minho fishery is not taken into account because it is mainly under maritime jurisdiction.

(5) Brackish lagoons are under maritime jurisdiction in BG, DE, DK, FR, PL, PT.

Figure 73. Employment in commercial inland fisheries (source: Ernst & Young, 2011)

In many Member States, inland fishing is not a full-time or even part-time occupation; it is mostly a recreational activity spread along rivers and lakes. This is also reflected in the number of fishermen active in the different countries. In Finland in Tampere, the second largest region of the country in terms of population for example, there are 13 registered commercial full time fishermen and 11 registered part time fishermen, whom both partake in both ice fishing and inland fishing. This number of registered fishermen is half the number it was 15

109 Cowx, I. G. (2015), Characterisation of inland fisheries in Europe. Fisheries Management and Ecology, 22: 78–87. doi: 10.1111/fme.12105

110 http://www.europarl.europa.eu/RegData/etudes/note/join/2014/514001/IPOL-PECH_NT%282014%29514001_EN.pdf

years ago. Based on a study[111] conducted in 2008, the professional fishermen in Pirkanmaa are rather old on average. The average age of the commercial fishermen exceeds 52 years. Another example is Italy, where some 1.000 fishermen have been identified, involved in inland fishing for only a small part of their time. The catch volume and value of their catch is more or less the same in both countries, with a yearly catch of 300 to 400 tonnes and a value of 700 to 800 thousand Euros.

Hungary is a different situation; as of December 2013 commercial fishing is prohibited on lake Balaton, the largest freshwater lake in Hungary and Central Europe. Based on a recent government decision, from January 2016 onwards, commercial inland fishing will even be prohibited in entire Hungary. Overall, lake Balaton is primarily focused on tourism and not on commercial fishing. In Hungary, recreational fishing is a significant activity and popularity of this type of fishing was also one of the reasons for the government to prohibit commercial inland fishing as a whole. Currently, there is one company – Balatoni Halgazdalkodasi zrt. – in the region (founded in 2009), that is involved in the protection of the variety of fish species in the lake and aims to provide an optimal catch rate for recreational fishermen.

Some additional findings with respect to commercial and recreational inland fisheries are presented in Figure 74.

	Inland commercial	Inland recreational
Direct levels of employment	In a few countries stable, otherwise declining, can have local importance, largely older age profile with few young recruited	Minor in extensive, natural systems, where individuals employed seasonally as tutors, or as inspectors/or bailiffs or ghillies. Can be of more importance in intensively managed systems such as fishing ponds
Indirect employment	Minor. Depending on fishing methods and equipment, some multiplier effects in supplies sector. Modern fishing techniques probably generate as much outside as inside the region (or even country) for example imported equipment	Angling-related tourism has great potential for generation of employment in services and supplies. Highly prized species, such as salmon, and specimen-size catches of other size species are particularly important
Revenue	Minor compared to other subsectors, and in particular marine commercial fisheries	Revenues generated from licence sales can be significant. In some countries used to finance research and fisheries management activities
Multiplier effects	Minor. Most local effects would occur where traditional gear is used	Additional spending subsequent to the fishing 'trip' can be substantial
Social benefits	Provides income and employment in rural areas where other options for work are limited or non-existent. Assists social cohesion	Social 'well-being'. Provides alternative sources of income for rural communities through angling-related tourism. Assists social cohesion

Figure 74. Socio-economic issues related to inland fisheries (source: Cowx, I. G. (2015), Characterisation of inland fisheries in Europe. Fisheries Management and Ecology, 22: 78–87. doi: 10.1111/fme.12105)

Taking into account the ancillary sector, little services are being offered to this industry specifically. Companies offering equipment mostly depend on recreational – angling – activities. Commercial fishermen that are active, perform most ancillary activities themselves. Complementary services have been observed in and around lakes (e.g. guided tours and other recreational activities on lakes for tourists), but there does not seem to be a linked to formed commercial fishermen. Inland fishermen are mostly older males, not trained for complementary

[111] Esiselvitys ammattikalastuksen kehittämisestä ja mahdollisuuksista Pirkanmaalla ja Kanta-Hämeessä. Pirkanmaan kalatalouskeskus. Sanna Ojalammi. Pirkanmaan kalatalouskeskuksen julkaisuja nro 55. Tampere 2008.

activities. In general, inland fishing is not an attractive sector for younger people to work in, due to declining work opportunities, declining income rates and more regulation. Especially regulation can have a significant impact on the attractiveness of the sector. Where inland fishing is already going to be prohibited in Hungary, in Finland, proposed new regulation prescribes that each caught fish must comply with a minimum length. While this – in the long run – should increase the tonnage and the value of the catch, fishermen fear that it will become difficult to earn a decent living from inland fishing and ice fishing activities in Finland. Beside regulatory changes, the main reasons for the decline in inland fishing are:

- Conflicts with other sport fishing / water events on the lakes;
- Fish suffers from pollution and fishermen are dependent on re-stocking of lakes;
- Little public support for inland fishing;
- Lack of an appropriate resource management model and infrastructure for inland fishing (as inland fishing takes place on relatively small water bodies)

6.2 Ice fishing

The results in this paragraph are based on desk research and five case studies throughout Europe. There is a clear link between ice fishing and inland fishing, therefore the results in this paragraph are closely related to paragraph 6.1 on inland fishing.

Ice fishing is a popular activity when ice covers the usual fishing grounds of large lakes and rivers. Ice fishing is primarily practiced in the north of Europe, more specifically in the Baltic States, Sweden and Finland during November – March in the most northern regions. Ice fishing is done for both commercial and recreational purposes. Looking at commercial ice fishing, the same commercial fishermen often ice fish to overcome the winter months, while recreational ice fishing is a popular local activity with cultural and historic roots. Recreational ice fishing is also practiced in Poland, Austria, Bulgaria and the Czech Republic. Little is known about the geographical spread of recreational ice fishing but the popularity of ice fishing in for example Finland suggests that recreational ice fishing takes place on all lakes and rivers[112]. Catch from recreational ice fishing is often used for private consumption or sold locally. Figure 75 presents the most important fishing areas in countries where ice fishing is done for commercial and recreational purposes.

Member State	Lakes and Reservoirs	Rivers	Ownership
Sweden	Vänern, Vättern, Mälaren lakes + 35 other lakes and reservoirs	-	State (5 largests lakes) Private (other lakes and reservoirs)
Finland	67 natural lakes	-	Numerous public and private owners, jointed into fishery associations
Estonia	Lake Peipsi, Lake Vorstjarv	Emajogi River, Narva river	State
Latvia	Lakes of Latgale and Kutzeme areas	Daugava river	State
Lithuania	Some large lakes (Kruonis and Kaunas reservoirs)	Nemunas and Sventoji rivers	State (mostly)

Figure 75. Fishing areas ice fishing

Currently, little data is collected on employment levels and income. In addition, little is known about the socio-economic characteristics of ice fishers. Main reason for this is that data is often part of data gathered for inland fishing and marine fishing without a distinction between winter and summer fishing and that ice fishing is not monitored closely. Nevertheless some data has been found on catch values in commercial ice fishing in Finland

[112] http://www.rktl.fi/tilastot/

and Estonia. The data is presented in Figure 76, Figure 77, and Figure 78, where the winter season is from November until March[113].

Year	Winter season fishing (in thousands)	Coastal fishing total (in thousands)	Share of winter fishing (in %)
2000	2.584	10.358	25%
2001	2.110	9.209	23%
2002	2.208	9.380	24%
2003	1.805	9.538	19%
2004	2.256	8.414	27%
2005	1.836	7.849	23%
2006	1.559	8.102	19%
2007	1.948	7.496	26%
2008	1.892	8.170	23%
2009	1.860	8.575	22%
2010	1.804	9.244	20%
2011	2.051	10.758	19%
2012	2.179	9.714	22%
2013	1.743	10.065	17%

Figure 76. Winter season fishing in Finland (catch values)[114]

Year	Winter season: Coastal fisheries (in tonnes)	Winter season: Inland fisheries (in tonnes)	Winter season: Total (in tonnes)	Total catch volume (in totals)	Share of winter fishing (in %)
2009	534	630	1.164	17.906	7%
2010	304	451	755	14.382	5%
2011	277	562	839	13.696	6%
2012	307	394	701	12.133	6%
2013	548	435	983	12.714	8%
2014	740	615	1.355	13.735	10%

Figure 77. Winter season fishing in Estonia (catch volumes)[115]

[113] Given the winter conditions in Finland and Estonia, it is assumed that all fishing activities between November and April are conducted on ice.

[114] Fishery Economics Department of the Finish Ministry of Agriculture

[115] Fishery Economics Department of the Estonian Ministry of Agriculture

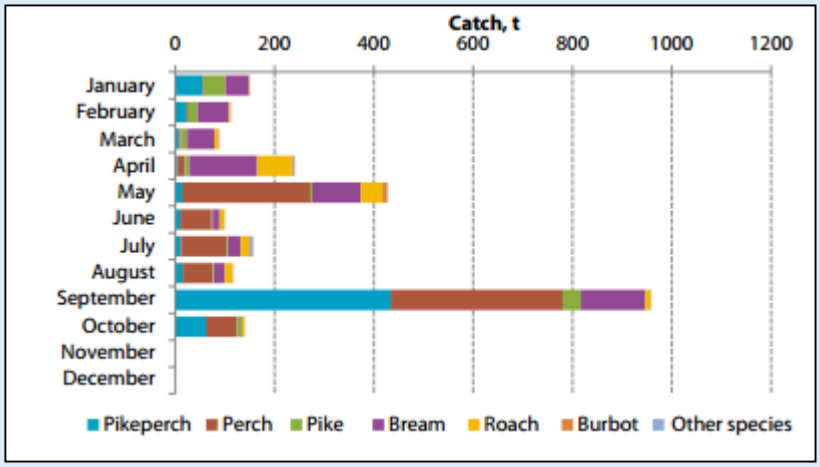
Year	Winter season: Coastal fisheries (in thousands)	Winter season: Inland fisheries (in thousands)	Winter seasons: Total (in thousands)	Total value (in thousands)	Share of winter fishing (in %)
2009	623	1.086	1.709	7.127	24%
2010	503	1.222	1.725	8.148	21%
2011	76	27	103	447	23%
2012	83	35	118	503	23%
2013	98	31	129	544	24%
2014	114	34	148	553	27%

Figure 78. Winter season fishing in Estonia (catch values)[116]

Looking at recreational ice fishing, much less information is available, since it is often part of more generic data on recreational data and tourism and often no licenses are needed for these fishing activities. Nevertheless, observations indicate that in for instance Finland, 90% of the total inland catch (ice fishing and inland fishing combined) is recreational[117]. In other words, the recreational sector can be of significant importance to local communities. In Estonia, recreational fishing, including ice fishing is growing rapidly[118], and the popularity of recreational ice fishing is expected to keep growing in the near future for all EU countries where these activities take place[119]. During winter months some 50 fishermen have reported catch in Estonia, of which some 50% reported catch only during winter months (which can be considered as purely ice fishers and not commercial inland fishermen). The percentage women in Estonia with a permit to fish on lakes was 1% in 2009 and 3.5% in 2014. Some studies were found on ice fishing on Lake Peipsi, Estonia, of which the most important findings are presented in Figure 79.

Case study Lake Peipsi, Estonia.

Catch volumes are available from the Estonian Fisheries Information Centre's yearly report[120]. The report includes catch volumes per month and the catch volumes from January and February, indicating the catches from winter fishing. Catches from winter fishing include Pikeperch, Pike and Bream.



116 Fishery Economics Department of the Estonian Ministry of Agriculture

117 http://www.mmm.fi/en/index/frontpage/Fishing,_game_reindeer/Recreational_fishing.html

118 Ministry of Environment. 2013. Recreational fishing gaining popularity. Estonian Ministry of Environment press release from 08.09.2013.

119 Source: Bell, Simon, et al. "Outdoor recreation and nature tourism: A European perspective." *Living Reviews in Landscape Research* 1.2 (2007): 1-46.

120 http://www.kalateave.ee/images/pdf/Estonian_Fishery_2013_veeb.pdf.

The table presented above indicates that Pike is an important species in ice fishing. The volume of Pikeperch and Bream in ice fishing is limited compared to summer catch volumes.

A recent academic study on the socio-economic importance of ice fishing on Lake Peipsi also provided several relevant insights [121]:

- 20% of the recreational ice fishermen on lake Peipsi are locals while 80% come from abroad (averagely traveling 210 km).
- 46% of the visiting fishermen are Latvian tourists.
- The average daily revenue from ice fishing is 20 euros.
- Unemployed or retired persons regularly do recreational fishing for additional earnings.

Figure 79. Case study Lake Peipsi, Estonia

It can be concluded that ice fishing is important; not from a production point of view, but for touristic purposes. In the near future, the importance of ice fishing as recreational activity will increase. In Estonia, there are approximately 10 larger companies providing complementary ice fishing services in Lake Peipsi region[122]. Local experts from the Peipsi Kalanduspiirkonna Arendajate Kogu estimated that there are probably even more micro companies (self-employed) that take tourists on the ice. Furthermore, the demand for such services is increasing, which makes ice fishing a more integral part of the tourist industry. Some of the entrepreneurs within the complementary sector utilise connections with the professional fishermen and try to engage them in touristic activities. However, this seems to only concern a few individuals, which makes the link to and engagement of (former) commercial fishermen weak at best.

6.3 Seaweeds industry

The information in this paragraph is based on desk research and on 4 case studies conducted within the seaweeds industry.

The global seaweed industry has an estimated total value of 10 billion Dollars per year[123, 124]. Almost 25 million tonnes of seaweeds and other algae are harvested annually for food, cosmetic products, and fertilizers, or are further processed to extract thickening agents, bio-fuels or additives for animal feed[125]. Global seaweed production comes from aquaculture and harvesting. According to the available data, 33 countries and territories worldwide harvested 23.8 million tonnes (wet weight) of aquatic plants from aquaculture, while harvesting in the wild added up to 1.1 million tonnes (in 2012). The global production of farmed seaweeds more than doubled from 2000 to 2012[126]. Asian countries dominate seaweed culture production (99.05 % by quantity and 99.36 % by value[127]).

Europe is a small player in the seaweeds industry and the production of seaweeds in Europe has declined in the past decade. The production remained stable above 350.000 tons until 2000 and has since then decreased[128]. The European seaweed processing industry partly compensates for the lack of European seaweeds by using external supply. Traditionally, the harvesting of seaweed was an activity undertaken by the coastal community seeking to increase their income. In some countries – especially the southern European countries – seaweeds are still harvested manually on foot.

Figure 80 presents an overview of the seaweeds industry in Europe.

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121 Orru, K., Kangur, K., Kangur, P., Ginter, K., & Kangur, A. (2014). Recreational ice fishing on the large Lake Peipsi: socioeconomic importance, variability of ice-cover period, and possible implications for fish stocks. Estonian Journal of Ecology, 63(4), 282-298.

122 These are bigger companies with staff, some of them have professional fishing licences and most of them also provide some kind of accommodation as well as other services such as boat rental, transportation across ice, and initial handling of fresh fish (Peipsi Kalanduspiirkonna Arendajate Kogu)

123 Bixler HJ, Porse H (2011) A decade of change in the seaweed hydrocolloids industry. J Appl Phycol 23:321–335

124 FAO (2013) Fisheries and Aquaculture Information and Statistics Service – 18/12/2013

125 http://www.fao.org/3/a-i3720e.pdf

126 http://www.fao.org/3/a-i3720e.pdf

127 FAO (2014) Fisheries and Aquaculture Information and Statistics Service - 16/03/2014

128 http://www.seaweed.ie/irish_seaweed_contacts/doc/Filieres_12p_UK.pdf

	France	Ireland	Spain	United Kingdom	Norway
Harvesting volume	**Total production:** 71.000 tonnes (in 2012) (5). **Species:** 60.000 tonnes of L. Digitata & 11.000 tonnes of L. Hyperborea (in 2012) (5). **Method:** 70.590 tonnes wild harvesting and 50 tonnes aquaculture (in 2012) (1)	**Total production:** 29.500 tonnes (in 2009) (4). **Species:** 25.000 tonnes of Ascophyllum nodosum (in 2009) (4). **Method:** Only wild harvesting (4). Ireland has only cultured seaweeds on an experimental basis (1).	**Total production:** 12.000 tonnes (in 2012) (1). **Species:** 10.000 tonnes for phycocolloid extraction industry (Agar agar, carragenats)(in 2012)(1). **Method:** 11.950 tonnes wild harvesting and 50 tonnes aquaculture (in 2012) (1).	**Total production:** 6.000 tonnes (in 2012) (1) **Species:** Many kinds of shore and seabed algae (in 2012) (1). **Method:** Only wild harvesting (in 2012) (1).	**Total production:** 175.000 tonnes (in 2010) (3). Has been declining over the past years (7). **Species:** Mainly Laminaria hyperborea (150.000 tonnes) and Ascophyllum nodosum (20.000 tonnes)(in 2012)(1). **Method:** Only wild harvesting (in 2012)(1).
Employment	There are approximately 35 vessels active in harvesting, where most of the seaweed is harvested on foot. In total, there are about 50 professional harvesters and about 300 occasional harvesters (in 2012)(6).	+/- 400 people including processing (in 2011) (2). Harvesting is typically done in teams of two, where the total number of harvesters is around 130. 49 people are full-time harvesters, while the remaining 81 only do so occasionaly (in 2011)(2).	- Unknown -	- Unknown -	+/- 250 people including processing (in 2012)(1). About 45 people are active in harvesting and are either employed by themselves, by the processing company or by the boat company (in 2012)(2).
Value	+/- 3.000.000 (in 2012)(1)	+/- 4.500.000 euros (in 2009) (4)	- Unknown -	+/- 1.300.000 euros (in 2012) (1)	- Unknown -

(1) Netalgae (2012). Overview of the seaweed industry by country.

(2) Marine institute (2011). Strategic review of th feasibility of seaweed aquaculture in Ireland.

(3) Meland, M. & Rebours, C. (2010). Short description of the Norwegian seaweed industry. Bioforsk Norway, Focus 7 (2).

(4) O'Tool, E. & Hynes, S. (2009). An economic analysis of the seaweeds industry in Ireland. SEMRU, working paper.

(5) Bretagne Developpement Innovation (2012). Etude de marché et d'opportunité économique relative au secteur de l'algue alimentaire. Programme BREIZH'ALG.

(6) Ministère de l'Écologie, du Développement Durable et de l'Énergie (2012). Expertise du projet de filière d'algoculture alimentaire en Bretagne. Rapport n° 008164-01.

(7) Netalgae (2012). The Norwegian seaweed industry. Work package 1 & 2.

Figure 80. Overview of seaweeds industry in Europe

6.3.1 Seaweed harvesting

Norway, France and Ireland dominate the European harvesting of seaweeds. Spain, Portugal and the United Kingdom are small suppliers of seaweeds. Mechanical harvesting is done with vessels in Norway, France, and to a lesser extend in Ireland. This mechanical harvesting is either done using specific mechanical equipment or using divers. In Spain the seaweeds industry is based on manual harvesting[129]. Harvesting on foot is done both in shallow waters during low tide and on the beaches.

Harvesting activities have a close link to for instance shellfish gathering and marine fishing, due to the seasonality of harvesting activities, where harvesters are active fishermen or shellfish gatherers during the low-season. In the end, harvesting can only be done during specific months when the seaweeds has sufficiently grown and also local conditions with respect to weather and sea conditions play an important role; calm weather and seas are required to perform harvesting activities.

[129] http://www.seaweed.ie/irish_seaweed_contacts/doc/Filieres_12p_UK.pdf

Looking at those employed in the sector, the study reveals that harvesters are either organised in companies or in associations and are mostly local males looking at those employed on vessels, where the number of (local) females is higher in on-foot harvesting activities. These companies and associations provide the necessary resources and channels (e.g. auction facilities, logistics, storage, et cetera) needed to sell the seaweeds to for instance processing companies. What must be noted is that in France, the industry is led by processors, where harvesters are contracted by processing companies for a certain quantity of seaweed. Local experts explain that processing companies became directly involved in the industry to ensure the quality of the product, which is especially important when seaweeds are intended for human consumption.

The importance of the harvesting industry is limited with respect to the fishing industry and the local economy. Nevertheless, the industry has potential, considering the fact that the market is dealing with significant undersupply in the whole EU. Undersupply is currently being filled using import (mainly from Asia), but there is potential in expanding harvesting activities in Europe. In general, this is a challenge in the industry; the harvesting industry is not very attractive due to relatively low prices compared to fish and shellfish and requires specific know-how to comply with the quality standards of the industry. Nevertheless, due to increasing prices offered for seaweed for human consumption, combined with developments in the marine fishing sector (low resources), some fishermen and shellfish gatherers have switched to harvesting of seaweeds permanently and are only active as fisherman or gatherer outside the harvesting season.

The sector ancillary to the harvesting of seaweeds is small; on-foot harvesters often use 'home-made' equipment or equipment bought at local convenient stores and harvesters that use vessels mostly maintain their vessels – and their equipment – themselves or use the same local companies as those used by fishermen. As a result, the dependency of ancillary companies on the harvesting sector is low.

6.3.2 Seaweed aquaculture

Although countries like China produce seaweeds by means of aquaculture on a large scale, in Europe, this is still relatively unexplored and experimental. Only Spain and France have some seaweed aquaculture (production of about 100 tonnes annually), while in the United Kingdom and Ireland, seaweed aquaculture is mostly experimental. During the desk research and case studies, some companies have been found that culture seaweeds, albeit on a very small scale. Nevertheless, the industry does seem to have potential, due to – similar to seaweed harvesting – the undersupply of seaweeds in the European Union. In general, due to the controlled environment in which seaweed is cultured, high quality can be offered to the market in relatively large volumes. Therefore, several initiatives haven been taken by companies – often financed by the local government – to promote seaweed aquaculture.

Unfortunately, this undersupply of seaweeds in the European Union has not yet led to a significant increase in production looking at seaweed aquaculture. Local experts explain that the main reason for this comes from the fact that there is resistance against seaweed aquaculture within local communities, limiting the number of available regions. This resistance mainly is caused by the fact that the local communities believe that seaweed aquaculture is a threat to the local ecosystem, since seaweed aquaculture may lead to the introduction of non-indegenous species. In addition, they feel that privatisation will not give proper incentives to companies to ensure sustainable use of the local environment. Finally, some of the regions suitable for seaweed aquaculture also have an active tourism industry, where the local community believes that seaweed aquaculture will form a threat to tourism. They explain that seaweed aquaculture and tourism cannot be mixed, as aquaculture will diminish the general appeal of the region.

6.3.3 Conclusion seaweeds industry

Overall, the seaweeds industry in Europe is small compared to global production of seaweeds and has been in decline over the past few years. The processing seaweeds industry is economically more significant and most people in the seaweeds industry work in processing. The economic value of seaweed-based products varies significantly, with agricultural products representing the low value products and food and cosmetics representing the high value products[130]. In the past few years, popularity of seaweeds for human consumption shows an increasing trend, where seaweeds is now perceived as a healthy food with lots of nutrients. The harvesting itself is regulated throughout Europe, where harvesters have to have permits to be able to harvest seaweeds. These permits specify where harvesters can harvest, on which species, and during which months of

[130] Netalgae (2012). Overview of the seaweed industry by country.

the year. Main reason for this regulation is to ensure the sustainability of harvesting activities in the regions, where permits are issued to individuals on a yearly basis. In general, harvesting activities on beaches are less monitored, due to its relatively low impact on the external environment[131]. Seaweed aquaculture is in the experimental phase in Europe with low volumes and resistance from (local) communities. There is potential though, due to the undersupply of seaweeds in Europe. Whether this increasing demand will stimulate European production or imports of seaweeds is still unclear. Given the potential of this industry, some impuls (for means of subsidies or likewise from governments or the European Commission) could speed up the process towards a more mature industry.

6.4 Shellfish gathering

The information in this paragraph is based on desk research and on four case studies on shellfish gathering conducted.

Shellfish gathering is done for both commercial and recreational purposes and takes place in intertidal areas (coastal zones) and rivers or lakes. Shellfish gathering is often linked to environmental protection and food safety policy, because attractive areas for shellfish gathering are often in special areas of conservation where specific arrangements are made to protect the ecological balance (i.e. areas where fishing with vessels and other fishing equipment is prohibited). Shellfish gathering is subjected to many regulation from a sustainability point of view. By definition, shellfish gatherers must posses a licence to be able to gather shellfish, where licenses are granted to individual gatherers and prescribe what gatherers can and cannot do. In Galicia, for instance, special Harvesting Plans – similar to harvesting seaweeds – prescribe the number of days on which shellfish can be caught, which species can be caught, in what area and in what season. Furthermore, in France, each gatherer has to have two licenses; one allowing him to gather shellfish in certain areas and certain species and one specifying which equipment he can use. Not all countries go this far in terms of prescribing what gatherers can do, but it is a strongly regulated sector nonetheless.

Currently, shellfish gathering activities are not part of the EU Data Collection Framework or any other national or regional statistical agencies. This makes it challenging to get a comprehensive overview of the shellfish gathering industry in the EU. If any data is available, this is often part of more generic data on fisheries or tourism, or anecdotal. Nevertheless, some studies and reports give a broad indication of the magnitude of employment and income in this sector. What is found is that shellfish are mainly gathered in Spain, Portugal, France, the Netherlands, Denmark and United Kingdom and common species are clams, abalone, mussels, oysters, scallops, cockles, crayfish, lobster, and crabs. Figure 81 presents an overview of the commercial sector of shellfish gathering.

	France	Spain	the Netherlands	United Kingdom
Employment	There are around 220 shellfish gatherers in Bretagne (2).	It is believed that around 5.700 people are involved in shellfish gathering on foot (4).	31 professional licenses have been issued (7).	During a case study in Strangfordlough, Northern Ireland, on average 7.1 harvesters were seen along the shore during each visit (8).
Socio-economic data	- Shellfish gathering is mostly done by women (1). - Unusual climate conditions have caused a shock in the shellfish stock in 2012 in mainly the region of Basse-Normandy (3).	- Spain has a large shellfish gathering industry with significant social importance (5). - Most of the shellfish gathering is done by women (4).	- Unknown -	It was found that most of the shellfish gatherers used their catch for personal consumption (8).
Areas	Bretagne, Normandy, Aquitine, and Pays de la Loire	Galicia, Asturias, Cantabria, Basque county, and Andalusia (6).	Waddenzee and Oosterschelde (8).	- Unknown -

(1) https://webgate.ec.europa.eu/fpfis/cms/farnet/nl/women-fisheries-european-parliament-study

131 When harvesting on beaches, the seaweeds have already been released from their natural environment by for instance storms, and wash ashore. Consequently, the impact on the environment is low and therefore less regulated.

(2) http://www.cdpmem56.fr/economie-et-statistiques/

(3) http://www.comite-peches.fr/organisation-professionnelle/peche-a-pied/

(4) http://ec.europa.eu/fisheries/documentation/studies/rbm/rbm_2009_part2.pdf

(5) https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/Axis_4_Spain.pdf

(6) http://ec.europa.eu/fisheries/documentation/studies/rbm/rbm_2009_part2.pdf

(7) http://www.msc.org/documents/fisheries-factsheets/ohv-dutch-waddenzee-and-oosterschelde-hand-raked-cockle-fishery-ffs-a4-paper-size

(8) www.ni-environment.gov.uk Shellfish Harvesting

Figure 81. Overview of EU shellfish gathering sector

Shellfish gathering is a very traditional activity, that has been performed for many decades. Often, gatherers still gather shellfish in the same way as they did decades ago. People involved in shellfish gathering learned to do so from family members. The activity is also not expected to change in the near future with respect to the way by which shellfish is gathered; it is a very traditional activity and will continue to be so for years to come. What must be noted, is that shellfish gathering is a physically demanding job, where gatherers have to release the shellfish from the bottom of the sea and collect them manually in all weather conditions. Therefore, it has become less interesting for young people to become active in this industry; other industries have proven to be a more stable and safer type of employment. This problem is especially found in Galicia in Spain, where only 2 out of 100 gatherers are under 30. This problem is reinforced by the fact that young people often cannot get a license, due to a lack in experience with shellfish gathering. Related to gender distribution, what is worth noting is that while in the Netherlands and Andalusia in Spain, gathering activities are mostly performed by males, in Galicia, shellfish gathering is almost purely a female activity (more than 90%) that is often performed by the wives of fishermen. A second observation from Galicia is that women are mainly engaged on shellfish gathering on foot, whereas the shellfish industry on board is performed mainly by men using artisanal vessels.

In economic terms, the importance is significant for specific local communities, but limited at the same time looking at the overall fishing activities in these areas. Overall, in terms of employment and income, the percentage coming from shellfish gathering is less than 5% in regions where this activity is performed. Still, in some local communities several hundreds, and even thousands in Galicia, are involved in this industry, and thus shellfish gathering proves to be of significant value to these communities. With respect to gathered volumes of shellfish, what must be noted is that, while the species gathered do not change, the tonnage caught each year can vary significantly. The shellfish stocks are highly dependent on local conditions and therefore total tonnage in the industry changes from year-to-year. In France for instance, some areas are closed for gathering activities when stocks are too low, caused by for instance a too low water temperature in Spring when shellfish are born. In the end, the impact of these developments on the industry can be significant.

One of the biggest threats to the sector are poachers. People without a license gather shellfish and sell them on the black market. This can be a very lucrative activity and in practice, it has been proven to be difficult to enforce the law and prevent poaching. For instance, in the Netherlands, people can gather up to 10 kilos without a license, hence it is not strange when people walk around beaches to collect shellfish. Often people use this freedom to illegally gather more shellfish. Illegal activity has been found in all the regions where case studies have been performed and many studies also explained poaching as a general issue in the sector related to the gathering of shellfish.

Looking at recreational shellfish gathering, it is difficult to collect data on the number of recreational gatherers, income and volumes. This is because recreational shellfish gathering is permitted without a license in many countries (up to a certain weight). Therefore, little data is collect on a structural basis. In for instance the Netherlands, gatherers are allowed to collect 10 kilograms of shellfish a day[132]. In France, one study was executed on recreational shellfish gathering and found the following[133]:

- Approximately 70% of recreational shellfish gatherers are tourists while approximately 30% are local or regional visitors;
- 58% of recreation shellfish gatherers are male and 42% females;

132 http://www.msc.org/documents/fisheries-factsheets/ohv-dutch-waddenzee-and-oosterschelde-hand-raked-cockle-fishery-ffs-a4-paper-size

133 http://www.iodde.org/public/Rapports/IODDE_RapportFinal_DiagnosticPNM2010_Pap_avril_2011_V2.pdf

- 15% of shellfish gatherers spent the night with friends or family. The other 85% spend their nights in hotels, camping sites, holiday homes or other holiday accommodations;
- The larger majority of shellfish gatherers are between 40 and 69 years old.

The industry ancillary to shellfish gathering is very small. This is mainly caused by the fact that very little material is needed to gather shellfish; only a tool to release the shellfish from the bottom of the ocean and bags to collect the shellfish. Although these are specialised tools, these can be bought in general fishing equipment stores that provide services to all kinds of marine industries. Furthermore, the high robustness of most of the equipment used by on foot gatherers, diminishing the importance of this segment of the ancillary providers. Some gatherers also have a boat to transport the shellfish during their catching activities. These boats are often maintained and serviced by the gatherers themselves, where more specialised activities are done by local technical companies also serving other industries. Although in general the ancillary services sector is small, in some regions the sector provides some special equipment such as the example of Andalucia below.

Shellfish gathering in Andalusia and the ancillary sector related

Nowadays, there are more than 300 licenses that allow professionals to conduct on foot shellfish gathering along the Andalusian coast, mainly targeted to mussels, and to a lesser extent to capture other marine invertebrates. Another important segment of shellfish gatherers is the crews on board artisanal vessels targeting stripped Venus clam. Mainly men are active in the shellfish industry both on board and on foot. Gears used must be traditional and environmental-friendly. The more usual gears used are dredges either towed or manual. Divers –both snorkel and scuba- collecting razors and other invertebrates are also considered shellfish gatherers.

There is some employment in activities ancillary to shellfish gathering in Andalucía, specially from those firms providing the manufacture of specific gears and equipment, and those associations providing activities related to the sale of the shellfish and management facilities. The producers associations, mainly the Cofradías, provide the latter services, in most cases as a complementary activity as the employees are also active shellfish gatherers. For instance, in 2014 Cofradía de Sanlucar de Barrameda, with 26 associates – 'mariscadores', employees 4 FTE and reveals an income of about 27.000 Euros from sales of shellfish gatherers.

7 A comparison of activities ancillary and complementary to marine fishing and aquaculture in other OECD countries

This section provides an analysis on the sector ancillary to marine fishing and aquaculture in other OECD countries, and more specifically, in Canada, Iceland, Japan, New Zealand, Norway and the United States. In addition, a comparion of findings is made between the findigs collected on other OECD countries and findings collected on Member States in the European Union. In Annex VIII a deep analysis per country is presented, where in this Section only the main findings will be discussed, including a comparison with findings from the desk research and case studies performed in the European Union.

The analyses performed is based on thorough desk research, where a complete list of sources for this analysis is provided in Annex VII and an extensive bibliography is provided in Annex IX. In the Annex VII, all data related to employment, income and other socio-economic characteristics in the sector ancillary to marine fishing and aquaculture is presented for each of the countries presented in this analysis.

With respect to all the studies and data found and similar to the findings of the desk research on countries in the European Union, it is important to take note of the fact that most of the studies that were collected used different research methods and different definitions of the sector ancillary to marine fishing and aquaculture. Therefore, one should be careful when interpreting and comparing results presented in this chapter. In general, the method that was applied in this desk research was similar to the method that was used for the desk research on Member States in the European Union and therefore also deals with the same constraints as outlined in detail in Annex IV. In the end, this method was used to ensure that findings from other OECD countries could be compared with findings from the Member States.

To put things in context, it is first important to look at the primary sector related to marine fishing and aquaculture. What is found, is that the marine fishing industry is larger than aquaculture in terms of value, in terms of volume and in terms of employed in all countries analysed in this chapter. Only in Norway, a more equal division between marine fishing and aquaculture activity is found. Looking at trends in both sectors, most countries observed a decline in marine fishing activity in terms of employment, mostly related to decreasing quota and the decommissioning of vessels. What must be noted is that marine fishing activities in both Canada and Norway shifted to more valuable species, making up for the decline in volume and overall employment in the sector. Looking at aquaculture, in most countries an increase in employment, income and volume has been observed.

In Figure 82 an overview of multipliers collected from the desk research on other OECD countries is presented. When looking at the relationship between the primary sector and the ancillary sector, most employment and income multipliers seem to lie between 0.5 and 1, both in marine fishing and in aquaculture looking at studies that applied more or less the same definition as the definition being applied in this study. In other words, when one extra fishermen or fish farmer is created, 0.5 to 1 FTE is created in the sectors ancillary to marine fishing and aquaculture. Looking at the entire fishing supply chain (i.e. from activities related to the production of fish to activities related to selling the fish to the end-consumer including processing as an ancillary activity) – marine fishing and aquaculture – multipliers seem to be above 1, where, when also taking induced effects into account, multipliers between 2 and 4 have also been reported by a number of studies; i.e. per FTE employed in the primary sector, 2 to 4 FTE is created in the entire (local) economy. What must be noted is that multipliers in aquaculture do seem to be a bit higher than multipliers than multipliers found in marine fishing, albeit marginally[134]. This finding is consistent with the overall findings collected during the European case studies in this study (see Chapter 4).

Looking at income multipliers, more or less the same multipliers have between found; 1 euro generated in the primary sector seems to generate between 0,5 and 1 Euro in the sectors ancillary to marine fishing and aquaculture. Similar to employment multipliers, income multipliers increase significantly when more downstream activities and even induced effects are taken into account.

[134] What must be noted is that in general more multipliers for aquaculture have been found compared to multiplier in marine fishing.

Country	National multiplier	Regional multiplier	Definitions
Canada	**Study 1:** * For every tonne of volume produced in commercial fishing, €1,85 is generated. * For every tonne of volume produced in aquaculture, €4 is generated. * Per fisherman, 0,68 people work in the processing sector. **Study 2:** * Per fisherman, 0,45 people are employed indirectly. * Per Euro income in fisheries and aquaculture, 0,35 Euros of income is generated in indirect activities (not accounting for processing). * Per Euro income in fisheries and aquaculture, 0,36 Euros of income is generated in induced impacts (not accounting for processing).	**British Columbia:** * For every Euro in wages generated directly, ~0,5 Euro is generated through indirect and induced effects. * For every FTE generated directly, ~0,5 FTE is generated through indirect and induced effects. * For every Euro generated in revenue from trawl fishing in British Columbia, 0,71 Euro is generated in wages in British Columbia.	**Study 1:** * Not explained **Study 2:** * With direct impacts the report means the value that is added/generated in the fisheries industry itself, which is defined as the primary harvesting activities and processing activities. * Indirect impacts are defined as value added/generated that forms in the industries that are responsible for supplying the fishing industry with resources (backward connections, defined in the inception report as upstream) or for example further processing of the industry's products (forward connections, defined in the inception report as downstream) . * With induced impacts is meant the added value that forms in sectors that provide employees of the fishing industry, employees and companies of the ancillary industry and related industries with goods and services. **British Columbia:** * Not explained
Global	**Study 1:** Multipliers of landed value versus economic impact are as follows per continent: * Africa: 2.59 * Asia: 2.67 * Europe: 3.12 * Latin America: 2.05 * North America: 3.52 * Oceania: 3.27 * World total: 2.80 Multipliers of landed value versus generated household income from fisheries are as follows: * Africa: 0.62 * Asia: 0.71 * Europe: 0.76 * Latin America: 0.56 * North America: 1.22 * Oceania: 0.73 * World total: 0.75		**Study 1:** * The report makes a distinction only between primary and secondary activities. * Primary activities are defined as harvesting. * Economic impact is defined as direct + indirect + induced effects. Direct being defined as primary harvesting, indirect being defined as activities in the fisheries value chain and induced being defined as activities supporting or related to the fisheries value chain.

Country	National multiplier	Regional multiplier	Definitions
Iceland	**Study 1:** * Per fisherman, 1,39 people work in the processing sector. **Study 2:** * Per fisherman, 1,57 people are estimated to work in the ancillary sector, based on around 4.600 people employed in the primary harvesting industry (4000 in processing) , and 7.225 in the ancillary sector, in 2010.		**Study 1:** * Not explained **Study 2:** * The report attempts to establish the direct, indirect and demand contribution of the fisheries industry to Iceland's GDP. * With direct contribution the report means the value that is added/generated in the fisheries industry itself, which includes the primary harvesting activities and processing . * Indirect contributions is value added/generated that forms in the industries that are responsible for supplying the fishing industry with resources (backward connections, defined in the inception report as upstream) or for example further processing of the industry's products (forward connections, defined in the inception report as downstream) . * With demand contribution is meant the added value that forms in sectors that provide employees of the fishing industry and related industries with goods and services (this comes close to what other studies generally term as 'induced effects/multipliers').
Japan	**Study 1:** * For every person employed in the primary sector, 0,96 were employed in the secondary sector. * When considering only the full-time employed, this ratio is 0,84. * The ratio of income between the primary and secondary sector is difficult to calculate, due to the lack of this distinction in most reports. However, the ratio between people employed and income for the entire fishery sector (primary + secondary) is approximately €25.000 per person employed (though this is significantly skewed when comparing to other countries, since this does not represent the amount per FTE). **Study 2:** * Per fisherman, 1,43 people are employed in the ancillary sector (see definitions). * Per fisherman, 0,98 people are employed in the processing sector. **Study 3:** * Per fisherman, 5 people are employed in the ancillary sector. * Per Euro generated in fishing, 20 Euro is generated in the ancillary sector.		**Study 1:** * Primary fishing activities are characterized as the actual fishing activities themselves, such as inland fishing or working on a fishing boat. * Secondary activities are designated as processing and distribution activities. * Ancillary activities such as supplies for fisheries, maintenance of fishing vessels and equipment and the like are not explicitly reported in these studies. **Study 2:** * No exact definition of the categories marine fishing, processing and marine fishing related activities on land is given. Marine fishing related activities on land comes closest to ancillary activities, but what this category contains precisely is not clear. **Study 3:** * Primary fishing activities are characterized as the harvesting of fish. * Ancillary activities are characterized as activities supporting the primary fishing activities, such as supplies, processing, distribution and sales. It is important to note that this is beyond the first point of sale. * Due to the nature of the study we cannot speak of FTE.

Country	National multiplier	Regional multiplier	Definitions
New Zealand	**Study 1:** * Per fisherman, €46.170 is generated.	**Hauraki Gulf (Aquaculture in Auckland):** * For every aquaculture employee, 0,56 people were employed in the ancillary sector. * For every aquaculture processing employee, 0,38 people were employed in the ancillary sector. * For every aquaculture employee, 4,16 people were employed in aquaculture processing. * For every Euro generated in aquaculture farming, 0,69 Euro was generated through ancillary activities. * For every Euro generated in aquaculture farming, 0,37 Euro was generated through aquaculture processing. **Hauraki Gulf (Aquaculture in Waikato):** * For every aquaculture employee, 0,97 people were employed in the ancillary sector. * For every aquaculture processing employee, 0,60 people were employed in the ancillary sector. * For every aquaculture employee, 3,55 people were employed in aquaculture processing. * For every Euro generated in aquaculture farming, 0,17 Euro was generated through ancillary activities. * For every Euro generated in aquaculture farming, 0,41 Euro was generated through aquaculture processing. **Hauraki Gulf (Commercial Fishing in the entire Gulf):** * Multipliers between direct and ancillary cannot be calculated, due to missing data. * However, for commercial fishing €32.924 is generated per fisherman. * For Aquaculture in Auckland and Waikato this multiplier is much higher on average at around €237.500 per employee.	**Study 1:** * Not explained. **Hauraki Gulf (Aquaculture in Auckland):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing. **Hauraki Gulf (Aquaculture in Waikato):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing. **Hauraki Gulf (Commercial Fishing in the entire Gulf):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing.
Norway	**Study 1:** * For each person employed in fishing, 0,6 people are employed in other industries. * For each Euro generated in fishing, 0,6 Euro is generated in other industries. * For each person employed in aquaculture 1,4 people are employed in other industries. * For each Euro generated in aquaculture, 0,8 Euro is generated in other industries. * In fishing, €105.000 is generated per FTE. * In aquaculture, €290.000 is generated per FTE. * In processing, €60.000 is generated per FTE. **Study 2:** * For every FTE in core activities, 0,93 FTE is generated in other		**Study 1:** * Other industries is not specified further, which means that it is difficult to gauge the multipliers with respect to the definitions in the inception report. **Study 2:** * Core activities are defined in the report as the combination of fishing, aquaculture, processing and wholesale

Country	National multiplier	Regional multiplier	Definitions
	industries. * For every €1 generated in core activities, €0,92 is generated in other industries. * For every €1 contributed to GDP from core activities, €0,73 is contributed from other industries.		
United States	**Study 1:** * For every person employed in aquaculture, 2 persons are estimated to be employed in downstream activities.	**Bristol Bay:** * For every FTE in fishing and processing, 2,8 FTE work in the downstream fisheries supply chain (indirect + induced effects). * For every Euro in fishing and processing output, 1,9 Euro of output is generated in the downstream fisheries supply chain (indirect + induced effects). * For every Euro in fishing and processing labour income, 2,1 Euro of labour income is generated in the downstream fisheries supply chain (indirect + induced effects). **Washington and California:** The associated multipliers between direct and indirect + induced were as follows: * For jobs the multiplier was 0,43 in Washington and 0,4 in California. * For output value the multiplier was 1,8 in Washington and 1,95 in California. * For labour income the multiplier was 1,07 in Washington and 0,84 in California.	**Study 1:** * Not explained. **Bristol Bay:** * The multiplier economic impacts of Bristol Bay salmon fishing and processing are the indirect and induced employment, income and output value resulting from the fishing and processing that occurs in Bristol Bay. **Washington and California:** * Indirect impacts quantify the effect of spending within the study region on supplies, services, labour, and taxes. Induced impacts measure the money re-spent in the study area as a result of the indirect impacts. Direct, indirect, and induced impacts sum to the total economic impacts of a project or industry. * It is unclear from the study whether the jobs figures are in FTE.

Figure 82. Results of the desk research on other OECD countries: Income and employment multipliers

The overall importance of the primary sector with respect to the country's economy is limited. Contribution to national GDP is often less than 1 percent in terms of output generated and less than 2-3% in terms of employment, where only in Iceland, given its overall dependence over the fishing industry, this percentage is around 7% in terms of output generated and 5% in terms of employment. Looking at the sector ancillary to marine fishing and aquaculture, contribution to the country's economy is similar and around 1% in terms of employment and income[135]. What must be noted that in some local communities the dependence is found to be much higher. For instance, in the United States, communities were found where 10% of income and employment depends on the fishing industry (including both the primary and the ancillary sector). Furthermore, in for instance New Zealand, the fishing industry and its ancillary sector is of significant importance for the traditional Maori people; overall, 27% of the Maori population is involved in fishing activity of some sort. Hence, while on a national level the economic importance of the fishing industry and its ancillary sector seems limited, it is found to be considerable in some local communities. This finding is consistent with findings in the European case studies during this study, where the overall importance of marine fishing and aquaculture with respect to the Member States' economies is limited, but for certain local communities or areas it is important.

Looking at resilience of the ancillary sector with respect to the primary sector (i.e. the extent to which the ancillary sector is impacted by changes in the primary sector), this mainly seems to rely on two things: (1) the importance of fishing to the local community and (2) the extent to which the service can be transferred to other industries. When marine fishing or aquaculture is a very important industry for the local community (for instance in New Zealand with its Maori population) and responsible for a large part of the local market's economic output, ancillary service providers will have less alternative industries to generate revenue from and thus are less resilient with respect to changes in the primary fishing industry. Looking at the type of service provided, when services offered are easy to transfer to other industries, the service is more resilient with respect to changes in the primary sector, since it is relatively easy to diversify. This is for instance the case in

[135] What must be noted is that companies active in the ancillary industry provide services to multiple industries and therefore the overall dependence of marine fishing and aquaculture related activities looking at the entire (local) economy is even lower.

services related to delivery of fuel and maintenance of vessels and technical equipment. On the contrary, activities related to net mending and weaving are highly specialised and therefore less transferable to other industries. By definition, this makes these companies less resilient. This seems to be the general finding across countries taken into account in this analysis and consistent with European observations made during the case studies in this study.

When comparing the results found in other OECD countries – Canada, Iceland, Japan, New Zealand, Norway, and the United States – with the findings of the desk research in the European Union, one can conclude that findings are very similar. Both employment and income multipliers found seem to lie between 0,5 and 1,0. However, when comparing the findings with the findings of the case studies, the multipliers seem to be higher in the studies presented in this section than the multipliers found in the case studies[136]. This seems to be mainly explained by the fact that in the studies presented in this section – and in the desk research related to the European Union – the definition of the ancillary sector is different from the definition of the ancillary sector used in the case studies. In general, more downstream activities that go beyond the first point of sale (e.g. retail, secondary processing, et cetera) have been taken into account in the studies performed throughout Europe and other OECD countries, resulting in an on average higher multiplier for both income and employment.

In the end, the data presented should be handled with caution, since rarely the same definition of ancillary services is used and indirect and induced effects are taken into account interchangeably.

[136] The average employment multiplier found in the case studies was around 0.3 for marine fishing and 0,6 for aquaculture and comparable for the income multipliers in these sectors.

Annex I – Supply Chain Marine Fishing and Aquaculture

The supply chain of marine fishing and aquaculture has been presented in figure A1 and A2 respectively.

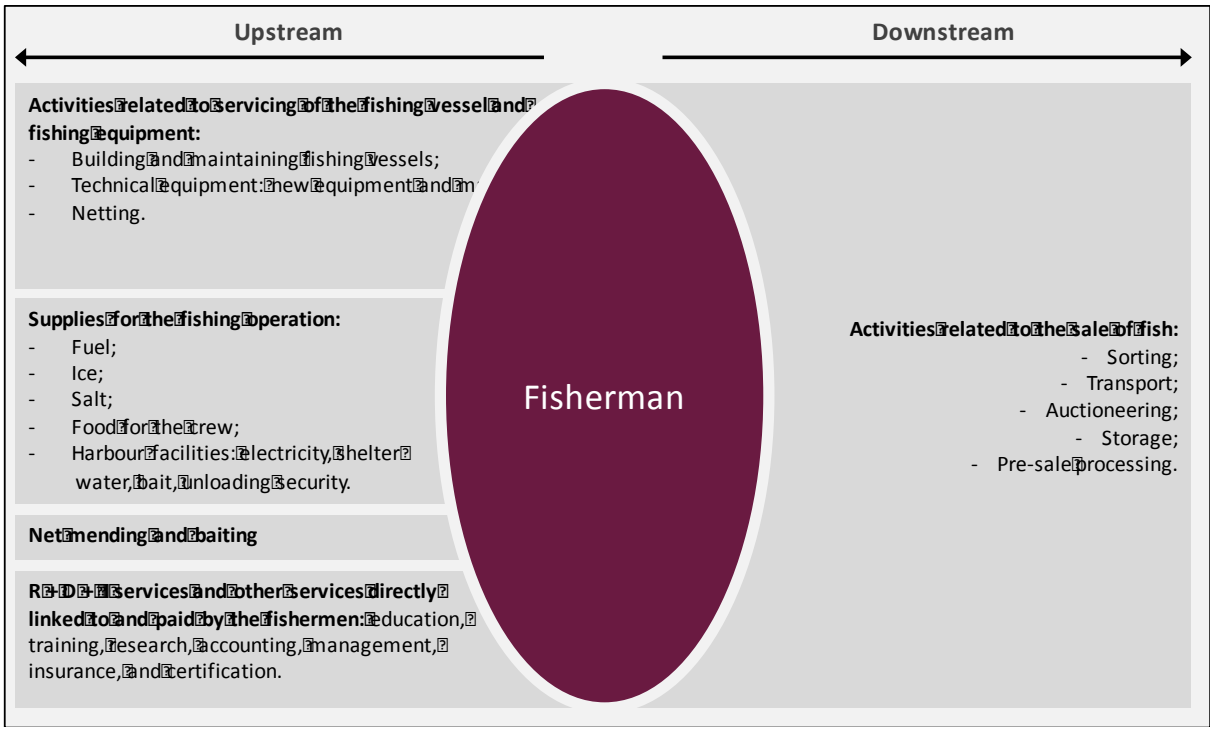

Figure A1. Supply chain marine fishing

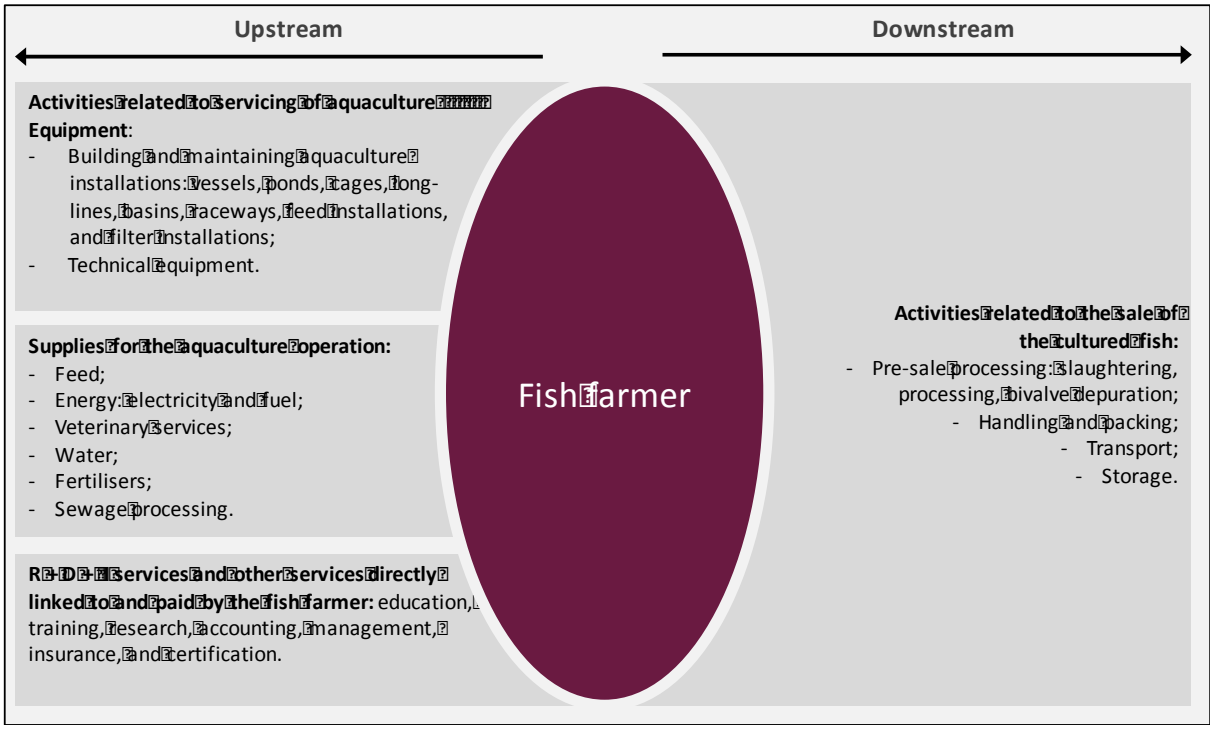

Figure A2. Supply chain aquaculture

Annex II – Consulted sources case studies

Figure A3 presents all the sources that have been consulted during the execution of the case studies. These sources have been specified per country, per case study and per type of source (e.g. face-to-face interview, phone call, e-mail, website, and studies).

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
1	Denmark	Marine fishing	Gilleje (Small-scale port)	Face-to-face interview	Port authority of Gilleleje	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Auction of Gilleleje	Ancillary service provider
				Face-to-face interview	Brdr Petersen Maskinfabrik Gilleleje	Ancillary service provider
				Face-to-face interview	Gilleleje Isværk AS	Ancillary service provider
				Website	Hanstholm Havns Olieforsyning Aps	Ancillary service provider
				Website	Gilleleje Bådbyggeri Aps	Ancillary service provider
				Website	Fiskernes Filetfabrik A/ S	Ancillary service provider
				Website	Central Business register	Register
2	Denmark	Marine fishing	Strandby (Small-scale port)	Phone call	Port Association	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Fishing organisation	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Hans Oestergard A/ S	Ancillary service provider
				Face-to-face interview	Strandby Net A/ S	Ancillary service provider
				Face-to-face interview	Strandby Skælisværk	Ancillary service provider
				Website	JOBI Group A/ S	Ancillary service provider
				Website	JL Skibsservice	Ancillary service provider
				Website	Fiskernes Samlecentral	Ancillary service provider
				Website	Hermans Vod-Trawlbinderi Aps	Ancillary service provider
				Website	Skibsforsikringer Frederikshavn G/ F	Ancillary service provider
				Website	Strandby Auctions	Ancillary service provider
				Website	Central Business register	Register
3	Estonia	Ice fishing	Lake Peipsi	E-mail	Estonian Ministry of Rural Affairs	Association, port authority, governmental organisation, et cetera
				Phone call	Peipsi Kalasduspiirkonna Arendajate Kogu	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Accomodation and transportation	Ancillary service provider
				Face-to-face interview	OU ROLEVAR	Fishing/ Aquaculture company
				Face-to-face interview	Estonian Ministry of Agriculture	Association, port authority, governmental organisation, et cetera
4	Finland	Ice fishing	Tampere Region	Phone call	Pro Kalastus	Ancillary service provider
				Phone call	Juha Happonen Trade name	Ancillary service provider
				Face-to-face interview	Finland's Inland professional fishermen	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Finland's Inland Professional fishermen	Fishing/ Aquaculture company
				Face-to-face interview	Pirkanmaan ELY-keskus	Association, port authority, governmental organisation, et cetera
5	Finland	Inland fishing	Tampere Region	Phone call	Sisko-Liisa Laitila Trade name	Fishing/ Aquaculture company

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Phone call	Natural Resources Institute Finland	Association, port authority, governmental organisation, et cetera
				Phone call	Järvi-Suomen Ely-keskus	Association, port authority, governmental organisation, et cetera
				Phone call	Pirkanmaan kalatalouskeskus ry	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	L. Mustalahti Trade name	Fishing/ Aquaculture company
				Face-to-face interview	Tampereen satamaravintolat oy	Complementary service provider
				Face-to-face interview	Nippon Verkko Ltd	Ancillary service provider
				Face-to-face interview	Natural Resources Institute Finland	Register
				Website	Statistics Finland; regional statistics on entrepreneurial activity	Register
6	Greece	Aquaculture	Thresprotia (Marine finfish aquaculture)	Phone call	Kotsis K. P.E.	Ancillary service provider
				Phone call	Vasiliadis K. O.E.	Ancillary service provider
				Phone call	Papadopoulos G. O.E.	Ancillary service provider
				Phone call	Karalis K. O.E.	Ancillary service provider
				Phone call	Troumbatas O.E.	Ancillary service provider
				Phone call	Andromeda S.A.	Ancillary service provider
				Phone call	Selonda S.A	Ancillary service provider
				Phone call	Maricom S.A.	Ancillary service provider
				Phone call	Vrakas V. O.E.	Ancillary service provider
				Phone call	Kolovos S. O.E.	Ancillary service provider
				Face-to-face interview	Fishery directorate of Thesprotia	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Association of Marine finfish aquaculture of Thesprotia	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Association of Small scale fishery of Sagiada	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Datsikas G. O.E.	Ancillary service provider
				Face-to-face interview	Zervas S. S.A.	Ancillary service provider
				Face-to-face interview	Corali Ltd	Ancillary service provider
				Face-to-face interview	Dagon S.A.	Ancillary service provider
				Face-to-face interview	Konakis S. O.E.	Ancillary service provider
7	Greece	Small Scale fishery	Lavrio (Industrial port)	Phone call	Papanikolaou E.	Ancillary service provider
				Phone call	Varythimiadis G.	Ancillary service provider
				Phone call	Revoil S.A.	Ancillary service provider
				Phone call	Nikolaou	Ancillary service provider
				Phone call	Alexiou	Ancillary service provider
				Phone call	Starvros A. O.E.	Ancillary service provider
				Phone call	Stoufis I.	Ancillary service provider
				Phone call	Sakkas G.	Ancillary service provider
				Face-to-face interview	Association of fishern of Lavrio	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Bliziotis I.	Ancillary service provider
				Face-to-face interview	Douvis K.	Ancillary service provider
				Face-to-face interview	Deligiannis N.	Ancillary service provider
8	Greece	Industrial Fishery	Mihaniona	Phone call	Kontogouris G. O.E.	Ancillary service provider

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
			(Industrial port)	Phone call	Homatas D. O.E.	Ancillary service provider
				Phone call	Paramaxidis K. O.E	Ancillary service provider
				Phone call	Basilakis Th. O.E.	Ancillary service provider
				Phone call	Vaporidis D. P.E	Ancillary service provider
				Phone call	Kehagias D. P.E.	Ancillary service provider
				Phone call	Kardamilas E. O.E.	Ancillary service provider
				Phone call	Agelidakis Bros O.E.	Ancillary service provider
				Phone call	Goudakis N. O.E.	Ancillary service provider
				Phone call	Velalis I. O.E.	Ancillary service provider
				Phone call	Doxakakis S. O.E.	Ancillary service provider
				Phone call	Kavasis I. O.E.	Ancillary service provider
				Phone call	Papadopulou E. O.E.	Ancillary service provider
				Phone call	Manos A. O.E.	Ancillary service provider
				Phone call	Kotikas K. P.E.	Ancillary service provider
				Phone call	Stamidis K. O.E.	Ancillary service provider
				Phone call	Holis E. O.E.	Ancillary service provider
				Phone call	Tellos G. P.E.	Ancillary service provider
				Phone call	Belas El. P.E.	Ancillary service provider
				Phone call	Nektarios P.E.	Ancillary service provider
				Phone call	Asimakis Ch. O.E.	Ancillary service provider
				Phone call	Kotsonis-Sabakoudakis O.E.	Ancillary service provider
				Phone call	Anemotrata S.A.	Ancillary service provider
				Phone call	KONVA S.A.	Ancillary service provider
				Phone call	Omiros S.A.	Ancillary service provider
				Face-to-face interview	Association of Midwater Fishery	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Voutsas P. O.E.	Ancillary service provider
				Face-to-face interview	Diopas S.A.	Ancillary service provider
				Face-to-face interview	Aquatrade S.A.	Ancillary service provider
				Face-to-face interview	Lazaridis Bros O.E.	Ancillary service provider
				Face-to-face interview	Athanasiou H. O.E.	Ancillary service provider
				Face-to-face interview	Fish Auction	Ancillary service provider
9	Greece	Small Scale fishery	Oropos (Industrial port)	Phone call	Lampadaridis K.	Ancillary service provider
				Phone call	Kargiamis G.	Ancillary service provider
				Face-to-face interview	Association of fishern of Lavrio	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Marinou A. P.E.	Ancillary service provider
				Face-to-face interview	Provelegios S. P.E.	Ancillary service provider
				Face-to-face interview	Kalogirou I. O.E.	Ancillary service provider
10	Greece	Complementary activities	Mihaniona	Phone call	Kontogouris G. O.E.	Ancillary service provider
				Phone call	Homatas D. O.E.	Ancillary service provider
				Phone call	Paramaxidis K. O.E	Ancillary service provider
				Phone call	Basilakis Th. O.E.	Ancillary service provider
				Phone call	Vaporidis D. P.E	Ancillary service provider
				Phone call	Kehagias D. P.E.	Ancillary service provider
				Phone call	Kardamilas E. O.E.	Ancillary service provider
				Phone call	Agelidakis Bros O.E.	Ancillary service provider

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Phone call	Goudakis N. O.E.	Ancillary service provider
				Phone call	Velalis I. O.E.	Ancillary service provider
				Phone call	Doxakakis S. O.E.	Ancillary service provider
				Phone call	Kavasis I. O.E.	Ancillary service provider
				Phone call	Papadopulou E. O.E.	Ancillary service provider
				Phone call	Manos A. O.E.	Ancillary service provider
				Phone call	Kotikas K. P.E.	Ancillary service provider
				Phone call	Stamidis K. O.E.	Ancillary service provider
				Phone call	Holis E. O.E.	Ancillary service provider
				Phone call	Tellos G. P.E.	Ancillary service provider
				Phone call	Belas El. P.E.	Ancillary service provider
				Phone call	Nektarios P.E.	Ancillary service provider
				Phone call	Asimakis Ch. O.E.	Ancillary service provider
				Phone call	Kotsonis-Sabakoudakis O.E.	Ancillary service provider
				Phone call	Anemotrata S.A.	Ancillary service provider
				Phone call	KONVA S.A.	Ancillary service provider
				Phone call	Omiros S.A.	Ancillary service provider
				Face-to-face interview	Voutsas P. O.E.	Ancillary service provider
				Face-to-face interview	Diopas S.A.	Ancillary service provider
				Face-to-face interview	Aquatrade S.A.	Ancillary service provider
				Face-to-face interview	Lazaridis Bros O.E.	Ancillary service provider
				Face-to-face interview	Athanasiou H. O.E.	Ancillary service provider
11	Hungary	Aquaculture	Hajdu-Bihar (Freshwater aquaculture)	Phone call	Haltap Kft.	Ancillary service provider
				Face-to-face interview	MAHAL	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Hortobágyi Halgazdaság zrt.	Ancillary service provider
				Face-to-face interview	Hortobágyi Nonprofit Kft.	Ancillary service provider
				Face-to-face interview	KOMPLETT-TEXT Bt.	Ancillary service provider
				Face-to-face interview	Research Institute for Agricultural Economics	Register
				Website	KEVIÉP	Ancillary service provider
				Website	TIVIZIG	Ancillary service provider
				Website	HAGE Hajdúsági Agráripari zrt.	Ancillary service provider
				Website	University of Debrecen	Ancillary service provider
				Website	Hungarofish	Ancillary service provider
				Website	NÁDEX kft.	Complementary service provider
				Website	Concordia Közraktár zrt.	Ancillary service provider
				Website	Omegaplast Kft.	Ancillary service provider
				Website	Pannon Guard zrt.	Ancillary service provider
12	Hungary	Inland fishing	Lake Balaton	Phone call	Hegedus Ferenc	Ancillary service provider
				Face-to-face interview	MAHAL	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	MASZ	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Balatoni Halgazdálkodási zrt.	Association, port authority, governmental organisation, et cetera

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Face-to-face interview	Research Institute for Agricultural Economics	Register
				Website	Agroplast Kft.	Ancillary service provider
				Website	Csónak Építő Kft.	Ancillary service provider
				Website	Handula Kft.	Ancillary service provider
13	Italy	Aquaculture	Puglia (Marine finfish aquaculture)	Phone call	Acquacoltura Jonica	Ancillary service provider
				Phone call	Seaproject	Ancillary service provider
				Face-to-face interview	Uria	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Ittilink	Ancillary service provider
				Face-to-face interview	Mare Impianti	Ancillary service provider
				Face-to-face interview	Cantieri navali Cavallo	Ancillary service provider
				Website	COISPA	Complementary service provider
				Website	TECNOSEA	Complementary service provider
				Website	Registroimprese.it	Register
14	Italy	Marine fishing	Ancona (Industrial port)	Phone call	Retimar	Ancillary service provider
				Phone call	Bollettini	Ancillary service provider
				Phone call	Granno	Ancillary service provider
				Phone call	Funiscoop	Ancillary service provider
				Phone call	Eurofuni	Ancillary service provider
				Phone call	Mori	Ancillary service provider
				Phone call	Coop Omnia	Ancillary service provider
				Phone call	Tribolini	Ancillary service provider
				Phone call	Zaccagnini	Ancillary service provider
				Phone call	Cantiere Navale Luigi & Pietro Anconetani	Ancillary service provider
				Phone call	Adriatic Yachting Service	Ancillary service provider
				Phone call	Cantiere Canaletti	Ancillary service provider
				Phone call	Euromare srl	Ancillary service provider
				Phone call	Selenav srl	Ancillary service provider
				Phone call	Staffolani	Ancillary service provider
				Phone call	Mer.it.an. Società Consortile srl	Ancillary service provider
				Phone call	Consorzio Pesca Ancona soc. Coop srl	Ancillary service provider
				Phone call	Frimers Cold System snc	Ancillary service provider
				Phone call	Electroimpianti	Ancillary service provider
				Face-to-face interview	Lega Pesca	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cooperativa Pescatori Motopeschereccì Ancona	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cooperativa Pescatori Motopeschereccì Ancona	Ancillary service provider
				Face-to-face interview	Tecnopesca Pacinets	Ancillary service provider
				Face-to-face interview	Grilli sas	Ancillary service provider
				Website	Conti Alberto	Complementary service provider
				Website	Quattro Dame	Complementary service provider
				Website	Quattro Dame	Complementary service provider

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Website	Touring Pescaittiturismo	Complementary service provider
				Website	Berluti Marco	Complementary service provider
				Website	Cesaretti Perri	Complementary service provider
				Website	RegistroImprese.it	Register
15	Italy	Marine fishing	Chioggia (Industrial port)	Phone call	Osservatorio Socio Economico della Pesca e Acquacoltura	Association, port authority, governmental organisation, et cetera
				Phone call	Co.Ge.Vo.	Ancillary service provider
				Phone call	Organizzazione Producctori Pesca Fasolari	Ancillary service provider
				Phone call	Union Coop	Ancillary service provider
				Phone call	Coopesca Chioggia	Ancillary service provider
				Phone call	Mercato ittico Chioggia	Ancillary service provider
				Phone call	CO.NA.VAR. srl	Ancillary service provider
				Phone call	Cantieri navali Chioggia CNC	Ancillary service provider
				Phone call	Cantiere Nautico Clodia	Ancillary service provider
				Phone call	Penzo srl	Ancillary service provider
				Phone call	S.I.V.A. srl	Ancillary service provider
				Phone call	S.N.C. Nova Ghiaccio	Ancillary service provider
				Phone call	La Casa del Ghiaccio	Ancillary service provider
				Phone call	Zennaro sas	Ancillary service provider
				Phone call	Bellemo Carburanti	Ancillary service provider
				Phone call	Scarpa Carburanti	Ancillary service provider
				Phone call	Varagnolo Zerlino	Ancillary service provider
				Phone call	Bullo Alberto	Ancillary service provider
				Phone call	Rossetti Antonio sas	Ancillary service provider
				Phone call	Peschereccio Nonno Renzo	Complementary service provider
				Face-to-face interview	San Marco Associazione Produttori pesca	Ancillary service provider
				Face-to-face interview	San Marco Associazione Produttori pesca	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Perini Vito	Ancillary service provider
				Face-to-face interview	Gianni petroli srl	Ancillary service provider
				Website	Registroimprese.it	Register
16	Italy	Complementary activities	Puglia	Face-to-face interview	Ittilink	Complementary service provider
				Face-to-face interview	Nave Francesco	Complementary service provider
				Face-to-face interview	Cooperativa Fra Pescatori	Complementary service provider
				Website	Cooperativa San Cataldo	Complementary service provider
				Website	Cooperativa Universo	Complementary service provider
				Website	Cooperativa Il Faro	Complementary service provider
				Website	Cooperativa Il Folgore	Complementary service provider
				Website	Cooperativa Pescatori dello Jonio	Complementary service provider
				Website	Cooperativa Stella Maris	Complementary service

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
						provider
17	Italy	Inland fishing	Veneto	Phone call	Obbiettivo pesca srl	Ancillary service provider
				Phone call	Osservatorio Socio Economico della Pesca e Acaquacoltura	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cooperativa Pescatori Garda	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cooperativa Pescatori Garda	Ancillary service provider
				Face-to-face interview	Retificio FAR srl	Ancillary service provider
				Face-to-face interview	DIMEC srl	Ancillary service provider
				Website	Italian Federation of Sport Fishing and Underwater Activities (FIPSAS)	Association, port authority, governmental organisation, et cetera
18	Netherlands	Aquaculture	Zeeland (Bivalve aquaculture)	Phone call	Padmos	Ancillary service provider
				Face-to-face interview	PO de Mosselhandel	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Aquamossel BV	Fishing/ Aquaculture company
				Face-to-face interview	Murre Installations	Ancillary service provider
				Face-to-face interview	Drive&Flow	Ancillary service provider
				Face-to-face interview	Steijn Oliehandel	Ancillary service provider
19	Netherlands	Marine fishing	IJmuiden (Small-scale port)	Phone call	Port Towage Amsterdam	Ancillary service provider
				Phone call	Bek & Verburg	Ancillary service provider
				Phone call	Holland Batteries	Ancillary service provider
				Phone call	Van Laar	Ancillary service provider
				Phone call	Kloosterboer	Ancillary service provider
				Phone call	Damen Shipyards Amsterdam	Ancillary service provider
				Phone call	Padmos	Ancillary service provider
				Face-to-face interview	Pelagic Fishing Association	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Zeehaven IJmuiden	Ancillary service provider
				Face-to-face interview	Hydrauvision	Ancillary service provider
				Face-to-face interview	Venus & de Waard	Ancillary service provider
20	Netherlands	Shellfish gathering	Friesland	Face-to-face interview	Provincie Friesland	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Geintegreerde visserij	Fishing/ Aquaculture company
				Face-to-face interview	De Oestervereniging	Association, port authority, governmental organisation, et cetera
21	Netherlands	Complementary activities	Zeeland	Phone call	Nationaal Park Oosterschelde	Complementary service provider
				Face-to-face interview	Vissersbond	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	PO Delta Zuid	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	De Oesterij	Complementary service provider
22	Poland	Aquaculture	Barycz (Freshwater aquaculture)	Face-to-face interview	Feed supplier: Gospodarstwo rolne Przemyslaw Jankowiak	Ancillary service provider
				Phone call	Aller Aqua	Ancillary service provider
				Face-to-face interview	FLAG Partnerstwo dla Doliny Baryczy	Association, port authority, governmental

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
						organisation, et cetera
				Face-to-face interview	Restaurant: u Bartka - gastronomy, angling ground	Complementary service provider
				Face-to-face interview	Stawy Milickie SA	Fishing/ Aquaculture company
23	Poland	Aquaculture	Mylof (Freshwater aquaculture)	Phone call	Aller Aqua	Ancillary service provider
				Face-to-face interview	Stawy pstrągowe Upilka S.C.	Fishing/ Aquaculture company
				Face-to-face interview	Zakład hodowli pstrąga w Zaporze-MYLOF	Fishing/ Aquaculture company
				Face-to-face interview	FLAG Morenka	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Restaurant: Restaurant 'AGA'	Complementary service provider
				Face-to-face interview	Canned fish producer: Evrafish	Ancillary service provider
				Face-to-face interview	Producer of cooling systems: Zakład Elektromechaniki Chłodniczej Paweł Wiecki	Ancillary service provider
24	Poland	Marine fishing	Kolobrzeg (Industrial port)	Phone call	Aller Aqua	Ancillary service provider
				Face-to-face interview	Storage and ice production: Kołobrzeska Grupa Producentów Ryb	Ancillary service provider
				Face-to-face interview	Bilge water collector: Zytki	Ancillary service provider
				Face-to-face interview	Sea port authority: Zarząd Portu Morskiego Kołobrzeg	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Producers Organization: Organizacja Rybaków Łodziowych	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Vessel owner: Janusz Parzych	Fishing/ Aquaculture company
25	Poland	Marine fishing	Wladyslawowo (Industrial port)	Face-to-face interview	Aller Aqua	Ancillary service provider
				Face-to-face interview	Producers Organization: Zrzeszenie Rybaków Morskich	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Vessel owner: Jarosław Kirszling	Fishing/ Aquaculture company
				Face-to-face interview	Shipyard: Szkuner - Michał Hernik (CEO)	Ancillary service provider
26	Spain	Aquaculture	Murcia (Marine finfish aquaculture)	Phone call	CULMAREX	Fishing/ Aquaculture company
				Face-to-face interview	Federación de Acuicultores de la Región de Murcia (FARM)- TAXON	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	BIOMAR	Ancillary service provider
				Face-to-face interview	TAXON	Ancillary service provider
				Face-to-face interview	RICARDO FUENTES E HIJOS	Ancillary service provider
				Website	Einforma (www.einforma.com)	Register
27	Spain	Marine fishing	Burela (Industrial port)	E-mail	Astilleros Armon	Ancillary service provider
				Face-to-face interview	ABSA	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cofradia de Pescadores de Burela	Ancillary service provider
				Face-to-face interview	Latitud	Ancillary service provider
				Face-to-face interview	Repsol	Ancillary service provider
				Face-to-face interview	Servicios Gralis Burela	Ancillary service provider
				Face-to-face interview	Talleres Roca Lopez	Ancillary service provider
				Face-to-face interview	Themar	Ancillary service provider

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Face-to-face interview	ADEXMAR	Ancillary service provider
				Website	Einforma (www.einforma.com)	Register
28	Spain	Marine fishing	Isla Cristina (Industrial port)	E-mail	Junta de Andalucía	Association, port authority, governmental organisation, et cetera
				Phone call	Vongolara SL-Punta Umbría	Ancillary service provider
				Face-to-face interview	Naval supplies: Reafer SL	Ancillary service provider
				Face-to-face interview	Technical equipment: Sail Hispano Comunicaciones S.L.	Ancillary service provider
				Face-to-face interview	Shipyard: Talleres Varadero C.B.	Ancillary service provider
				Face-to-face interview	Technical equipment: Electronaval Garcia	Ancillary service provider
				Face-to-face interview	Shipyard: Astilleros Nautica Vergel S.L.U.	Ancillary service provider
				Face-to-face interview	Fuel: CEPSA	Ancillary service provider
				Face-to-face interview	Cofradía de Pescadores de Isla Cristina	Association, port authority, governmental organisation, et cetera
				Website	Einforma (www.einforma.com)	Register
29	Spain	Marine fishing	Las Palmas (Long-distance port)	E-mail	FEDEPORT	Ancillary service provider
				E-mail	Zamakonayards	Ancillary service provider
				E-mail	Gobierno de Canarias	Association, port authority, governmental organisation, et cetera
				E-mail	ALBACORA	Ancillary service provider
				Phone call	Anidia SL	Ancillary service provider
				Phone call	Bridgecom Spain	Ancillary service provider
				Phone call	Autoridad Portuaria	Association, port authority, governmental organisation, et cetera
				Phone call	Serex Marítimos SL	Ancillary service provider
				Phone call	Cooperativa de pescadores de San Cristóbal	Ancillary service provider
				Face-to-face interview	ANACEF	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Andres Perdomo S.A.	Ancillary service provider
				Face-to-face interview	Cabos y Redes	Ancillary service provider
				Face-to-face interview	Natutical	Ancillary service provider
				Face-to-face interview	Roditrol	Ancillary service provider
				Website	Einforma (www.einforma.com)	Register
30	Spain	Marine fishing	Noia (Small-scale port)	Phone call	Andrade Mar S.L.	Ancillary service provider
				Phone call	Electrilar Noia S.L.	Ancillary service provider
				Phone call	Electrónica Ángel Castelao	Ancillary service provider
				Face-to-face interview	Cofradia de Pescadores San Bartalome de Noia	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Astileros Armado	Ancillary service provider
				Face-to-face interview	Repsol - Camariñas	Ancillary service provider
				Face-to-face interview	Nasas Meramar - Lira	Ancillary service provider
				Face-to-face interview	Taleres O'Freixo	Ancillary service provider
				Website	Einforma (www.einforma.com)	Register
31	Spain	Marine fishing	Ondarroa (Industrial port)	E-mail	Gobierno Vasco	Association, port authority, governmental organisation, et cetera

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Face-to-face interview	Cofradia de Pescadora Santa Clara de Ondarroa	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Asociacion ONE	Ancillary service provider
				Face-to-face interview	FECOPE/ ACOPES	Ancillary service provider
				Face-to-face interview	Inas Mujica	Ancillary service provider
				Face-to-face interview	Repsol de Burela	Ancillary service provider
				Face-to-face interview	Itxas Ondarru SL	Ancillary service provider
				Face-to-face interview	Itxas Lau Tailera	Ancillary service provider
				Face-to-face interview	Corganication de Proctores Pesca de Altura de Ondarroa	Ancillary service provider
				Face-to-face interview	EMS Seven Seas	Ancillary service provider
				Website	Einforma (www.einforma.com)	Register
32	Spain	Shellfish gathering	Galicia	E-mail	Xunta de Galicia	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	ASOAR-ARMEGA	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cofradia de Pescadores de Camariñas	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	UNIATRAMC-UGT	Association, port authority, governmental organisation, et cetera
				Website	Einforma (www.einforma.com)	Register
33	Spain	Shellfish gathering	Andalucía	Face-to-face interview	Jarife-Chipiona	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Fishing vessel 'GOMEZ SANTANA CUARTO' HU-2 4-06-Isla Cristina	Fishing/ Aquaculture company
				Face-to-face interview	Producers Organization 'CHIRLA DE ANDALUCIA'-Sanlucar de Barrameda	Association, port authority, governmental organisation, et cetera
				Website	Asociación de Mariscadores de la Bahía de Cádiz	Association, port authority, governmental organisation, et cetera
				Website	Einforma (www.einforma.com)	Register
34	Spain	Seaweeds_industry	Asturias (Wild harvesting)	E-mail	Principado de Asturias	Association, port authority, governmental organisation, et cetera
				Phone call	FECCOPAS	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Cofradía de Pescadores de Candas	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	COAG-Oviedo	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	ROKO SA-Oviedo	Fishing/ Aquaculture company
				Website	Einforma (www.einforma.com)	Register
35	United Kingdom	Aquaculture	Hampshire / Wiltshire (Freshwater aquaculture)	Face-to-face interview	Trafalgar Fisheries	Fishing/ Aquaculture company
				Face-to-face interview	Biotope	Ancillary service provider
				Face-to-face interview	Skretting Feeds	Ancillary service provider
				Website	British Trout membership - 2015	Studies
				Website	Hampshire Avon Catchment Partnership presentation - Wessex Chalk Stream & Rivers Trust - 2014	Studies

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Website	Test & Itchen Catchment Partnership - Catchment Action Plan - 2014	Studies
				Website	Aquaculture in Europe and the UK - The Marine Socio-Economics Project (MSEP) fact sheet - 2014	Studies
				Website	The Seafish Guide to Aquaculture - 2012	Studies
				Website	An Assessment of the Benefits to Scotland of Aquaculture - Marine Scotland - 2012	Studies
				Website	Test & Itchen River Restoration Strategy - Environment Agency - 2012 - by Atkins	Studies
				Website	Delivering sustainable feed solutions for aquaculture - Skretting - 2012	Studies
				Website	Aquaculture statistics for the UK, with a focus on England and Wales, 2012 - Defra	Studies
				Website	LANTRA Aquaculture factsheet 2010-2011 - 2012 - LANTRA, a specalist land-based rural training organisation	Studies
				Website	An overview of English Aquaculture - presentation - Keith Jeffery, Senior Fish Health Inspector, Cefas - 2011	Studies
				Website	Development of a scheme for monitoring sentinel farms in the UK trout industry - SARF028 project output - 2009 - Prof J Turnbull	Studies
				Website	Economic evaluation of inland fisheries, managers report - science project SC050026/ SR2 - Mawle and Peirson - Environment Agency - 2009	Studies
				Website	Economic evaluation of inland fisheries - welfare benefits of inland fisheries in England & Wales - science project SC050026/ SR2 - Lawrence and Spurgeon - Environment Agency - 2007	Studies
				Website	Water and Biodiversity Topic Action Plan, Hampshie Biodiversity Partnership, 2003	Studies
				Website	Socio-economic study of the UK trout industry - for the British Trout Association - 2001 - by Nautilus Consultants	Studies
36	United Kingdom	Aquaculture	Isle of Mull (Marine finfish aquaculture)	Face-to-face interview	Scottish Salmon Producers Organisation	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	The Scottish Salmon Company	Fishing/ Aquaculture company
				Face-to-face interview	Inverlussa Marine	Ancillary service provider
				Website	Scotland's aquaculture data website - www.aquaculturescotland - Scottish Government - 2015	Studies
				Website	Scottish Fish Farm Production Survey 2013 - Marine Scotland Science - 2015	Studies
				Website	Salmon Farming Industry Handbook 2015 - Marine Harvest	Studies
				Website	Salmon Farming, Sustaining Communities and Feeding the World - International Salmon Farmers Association - 2015	Studies
				Website	Mull Aquaculture and Fisheries Socio-Economic Study and Development Plan: Profile, economic contribution and development plan - Nautilus Consultants - 2014	Studies

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Website	Sustainable Scottish Salmon - Scottish Salmon Producers Organisation - 2014	Studies
				Website	Scottish Salmon Farming Annual Report - 2014 - Scottish Salmon Producers Organisation	Studies
				Website	Global Standard for Responsible Supply - requirements for certification - IFFO, the marine ingredients organisation - 2014	Studies
				Website	Sustainable Scottish Salmon - Scottish Salmon Farming Economic Report: Investing in sustainable jobs, communities and business - Scottish Salmon Producers Organisation - 2013	Studies
				Website	Scottish Salmon Farming Industry Research Report - SSPO - 2012	Studies
				Website	UKSeaMap 2010 project - habitat ecosystem mapping graphical interface - JNCC and others - 2010	Studies
				Website	SARF Project 046 - Socio-economic assessment of potential impacts of new and amended legislation on the cultivation of fish and shellfish species of current commercial importance - Hambrey Consulting - 2008	Studies
				Website	Employment in the EU based on Farmed Norwegian Salmon - by SINTEF for the Norwegian Federation of Trade Uninions - 2005	Studies
37	United Kingdom	Aquaculture	Isle of Mull (Bivalve aquaculture)	Face-to-face interview	Inverlussa Mussels	Fishing/ Aquaculture company
				Face-to-face interview	Isle of Mull Oysters	Fishing/ Aquaculture company
				Face-to-face interview	Muckairn Mussels	Fishing/ Aquaculture company
				Website	Scottish Neighbourhood Statistics- demography and socio-economics small area profiles - Scottish Government - 2015	Studies
				Website	Scottish Shellfish Marketing Group website - www.scottishshellfish.co.uk - SSMG - 2015	Studies
				Website	Scotland's aquaculture data website - www.aquaculturescotland - Scottish Government - 2015	Studies
				Website	Scottish Shellfish Farm Production Survey - Marine Scotland Science - 2014	Studies
				Website	Mull Aquaculture and Fisheries Socio-Economic Study and Development Plan: Profile, economic contribution and development plan - Nautilus Consultants - 2014	Studies
				Website	ScotMAP - mapping of inshore fishing activity around Scotland - Marine Scotland Science - 2014	Studies
				Website	The contribution of the shellfish catching, aquaculture and processing sectors to the UK and Scottish economies: components and multipliers - for Seafish by Erinshore Economics - 2013	Studies
				Website	Scottish schools dataset - Scottish Government - 2012	Studies

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Website	UKSeaMap 2010 project - habitat ecosystem mapping graphical interface - JNCC and others - 2010	Studies
				Website	The Seafish suspended Mussel Hyperbook business tool - 2002	Studies
38	United Kingdom	Marine fishing	Fraserburgh (Small-scale port)	Face-to-face interview	Fraserburgh Harbour Commissioners	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Caley Fisheries	Ancillary service provider
				Face-to-face interview	Macduff Shipyard	Ancillary service provider
				Face-to-face interview	R&D Downie	Ancillary service provider
				Website	MMO Sea Fisheries Statistics - landed volume and value - 2015	Studies
				Website	MMO Sea Fisheries Statistics - fishing fleet register - 2015	Studies
				Website	Scottish Sea Fisheries Statistics - fishermen employment - 2015	Studies
				Website	Fraserburgh Profile - Aberdeenshire Council - 2014	Studies
				Website	Seafish vessel costs and earnings surveys – http:/ / www.seafish.org/ research-economics/ industry-economics/ seafish-fleet-economic-performance-data - 2014	Studies
				Website	various press cuttings - for example http:/ / www.independent.co.uk/ life-style/ heroin-in-fraserburgh-1178726.html - 2011	Studies
				Website	Fraserburgh Community Profile - Aberdeenshire Community Planning Partnership - 2009	Studies
				Website	various Nautilus studies - on waste management, the port auction, pelagic processing, POs, etc.	Studies
				Website	Input:Output multiplier study of the UK Scottish Fish Catching and Fish Processing Sectors - Fraser of Allander Institute for Seafish - 2002	Studies
39	United Kingdom	Marine fishing	Weymouth (Small-scale port)	Face-to-face interview	Weymouth Harbour Authority	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	Stuttle Engineering	Ancillary service provider
				Face-to-face interview	Quayside Fuels	Ancillary service provider
				Face-to-face interview	Weymouth & Portland Inshore Fishermen's Association	Association, port authority, governmental organisation, et cetera
				Face-to-face interview	fisherman	Fishing/ Aquaculture company
				Website	MMO Sea Fisheries Statistics - landed volume and value - 2015	Studies
				Website	MMO Sea Fisheries Statistics - fishing fleet register - 2015	Studies
				Website	New local plan presentation Weymouth Town Centre 2015	Studies
				Website	Project Inshore - Defra / SAGB - 2013-2015	Studies
				Website	Weymouth and Portland Borough Council Local Development Plan 2014	Studies
				Website	Southern IFCA Annual Plan 2014 to 2015 - 2014	Studies
				Website	Defining the Economic and Environmental Values of Sea Bass - Nov 2014 - Blue Marine Foundation	Studies

#	Country	Sector	Area (Segment)	Type of contact	Name organisation	Type of organisation
				Website	Weymouth and Portland Landscape Character Assessment – February 2013	Studies
				Website	Seafish Economic Survey of the UK Fishing Fleet - 2010, 2011 and 2012	Studies
				Website	A bio-economic review of recreational angling for bass (Decentrachus labrax) - M Dillon - University of Hull - 2004	Studies
				Website	Socio-Economic Baseline Study of the South West Fishing Industry - 2003 - Nautilus / Ekos	Studies
				Website	The Motivation, Demographics and Views of South West Recreational Sea Anglers and their Socio-economic Impact on the Region - Invest in Fish South West - Nautilus - 2003	Studies
				Website	Weymouth & Portland - Review of the Dorset Coast Fishery - Seafish Technical Report 323 - 1987	Studies

Figure A3. Consulted sources case studies

Annex III: Overview of desk research results within the EU

The tables below provide an overview of all data found during the desk research phase of this study. The tables present data on employment, income, other socio-economic data and multipliers for ancillary services in marine fishing and aquaculture. In the main report, those data and multipliers are used which have a similar definition as the definitions used during this study. In chapter 3 and 4 the results taken into account from the desk research are included in the regional data.

The data that is presented is not the result of calculations, but merely presents data that has been presented in the studies found during the desk research. For each study, where possible, a definition of ancillary activities is given to further clarify what is included in the data that is presented. It should be noted that considering the different definitions applied in the studies, presented figures have to be treated with caution.

III.1 Employment

Figure 83 presents the results of the desk research looking at employment data. Results are presented by country, where a distinction has been made between national and regional employment data.

Country	National Employment	Regional employment	Definition
Global	- 54.8 million people are engaged in the primary sector of fish production in 2010 (fishing and aquaculture), where Asia accounts for 87% of the total employment. - In 2010, it is estimated that 10 to 12 percent of world's population depends on fisheries and aquaculture, or 660 to 820 million people. - Based on the fact that 1 man takes care of 3 people, ancillary employment is estimated on 220 to 270 million people.	*- Not found -*	**National:** - The ancillary sector contains activities such as processing, packaging, marketing and distribution, manufacturing of fish-processing equipment, net and gear making, ice production and supply, boat construction and maintenance, research and administration. - Each jobholder provides for 3 people.
Europe	- In 2005, 187.2 thousand people were employed in the primary sector, 137.8 thousand people in processing, 63.4 thousand in aquaculture, and 18.9 thousand people in ancillary activities. - France (2.9), Italy (2.5) Greece (2.2), United Kingdom (1.5), and Span (1.5) account for 56% of total employment in ancillary activities with 10.6 thousand people.(2)	*- Not found -*	**National:** - Fishing sector consists of three sectors: the primary sector, processing, and ancillary activities. - Ancillary activities are not specified, other than activities directly related to fisheries and aquaculture.
Belgium	- In 2002, the estimated employment in fisheries was 623 full-time employees and 277 part-time employees (900 people in total). - In 2002, 1,415 people were estimated to be employed in	*- Not found -*	**National:** *- Not explained -*

Country	National Employment	Regional employment	Definition
	processing. - 6,000 persons are employed in ancillary activities.(3)		
Denmark	*- Not found -*	**Bornholm:** - In 1997, total employment in fisheries was 342. - Total number of jobs in ancillary activities was 148 in 1997, of which 30 at shipyards/shipbuilders, 23 at net lofts/gear manufacturers, 18 in engine repair/maintenance, 3 electricians, 5 in electronics, and 69 in industry service.(4) **Esbjerg:** - In 1997, total employment in fisheries was 659. - Total number of jobs in ancillary activities was 305 in 1997, of which 43 at shipyards/boat builders, 65 in net lofts/gear manufacturers, 83 in engine repair/maintenance, 30 in electronics and communication, and 84 in industry service.(4)	**Bornholm:** - Ancillary activities include shipyards/boat builders, net lofts/gear manufacturers, engine repair/maintenance, electricians, electronics, and industry service. **Esbjerg:** - Ancillary activities include shipyards/boat builders, net lofts/gear manufacturers, engine repair/maintenance, electronics and communication, and industry service.
France	*- Not found -*	**Sete:** - In 2007, total employment from the fisheries sector is 2,055 of which 1,000 in aquaculture, 730 in fishing, 310 in processing and 15 in ancillary services. - There are only 4 local companies that provide ancillary services: 1 company specialised in aluminium , 2 companies specialised in fiberglass construction, and 1 company specialises in fiberglass construction, repair and wood.(5) **Auray and Vannes:** - Upstream activities employs 35 people. - Downstream activities employs 90 people. - Support activities employs 40 people. - 700 people are employed in the primary sector.(6)	**Sete:** - *Not explained* - **Auray and Vannes** - Ancillary activities are divided into three categories: upstream activities, downstream activities, and support activities. - Upstream activities include construction, ship repair and related activities, fishing landing, fuel and oil, insurance, auction, and management. - Downstream activities include fishmongers, fishmongers and wholesalers, supermarkets, consumers, and restaurants. - Support activities include local authorities, banks, social services, maritime affairs, general council, and other services.
Ireland	**Study 1:** - In total, about 15,000 people are employed directly in the sea fishing, aquaculture and support industries. Of these, 6,100 people are employed in the fishing fleet, 4,000 in Seafood factories, 2,600 in the aquaculture industry and some 2,000 in ancillary employment servicing the industry.(7) **Study 2:** - A 78% increase in aquaculture production (36.6 tonnes) would result in	**Castletownbere:** - In 2010, 370 FTE were active in the primary sector (only fishing). - In total, the employment in the ancillary sector was 49 in 2010, of which 8 in fuel supplies, 17 in chandlery, 4 in fleet support, 9 in harbour services, and 11.5 in engineering.(11) **Killybegs (Study 1):** - In 2010, 271 FTE were active in the primary sector of marine fishing. - In 2008, employment in aquaculture is estimated at 43 people (full-time and part-time). - In total, the employment in the ancillary sector was 348 in 2009, of which 284 in fisheries related activities, 11 in service &	**National (Study 1):** - *Not explained* - **National (Study 2):** - Ancillary employment includes: Agriculture, business services, financial intermediation, seafood processing, food processing, hotel & restaurants, insurance and pensions, Petroleum, Transportation, and other sectors. **National (Study 3):** - *Not explained* - **National (Study 4):** - Ancillary employment among other things includes net making, chandlery, vessel repair, marketing, transport, engineering

Country	National Employment	Regional employment	Definition
	an increase of 828 ancillary jobs. - Total employment in the aquaculture sector in Ireland is estimated at 1,719 in 2013. (8) **Study 3:** - In 2010, 6,100 people were employed in the primary sector, 4,000 in processing, and 2,000 people in ancillary activities.(9) **Study 4:** - 6,703 people are employed in fisheries (4,987) and aquaculture (1,716), and 3,065 in processing (includes full-time and part-time employees). - 1,000 people are employed in the ancillary sector.(10)	retail, and 53 in offshore oil/gas, commercial port.(12) **Killybegs (Study 2):** - The primary sector in fishing employed 220 people in 2009. Primary employment in aquaculture is not explained. - In 2009, employment in the ancillary sector is estimated on 350 jobs.(13) **Ros an Mhil:** - In 2011, total employment in marine fishing was 199 FTE. - In 2011, total employment in the primary sector of aquaculture was 144 FTE (94 FTE in shellfish and 50 FTE in finfish). - In 2011, ancillary employment was estimated at 5.(14) Whitby, Yorkshire: - 250 to 300 people make a living from the fishing industry, directly or indirectly.(15)	and refrigeration (not further specified). **Castletownbere:** - Ancillary activities include vessel agents, fuel suppliers, chandlers, net repair, engineering (mechanical, electrical, hydraulic, refrigeration), fleet support (representation, management) and harbour services (ice, pilotage, synchro-lift, etc.). **Killybegs (Study 1):** - Ancillary activities include chandlery, fuel supplies, net makers, electrical/refrigeration, engineering, hydraulics, marine agents, cargo handlers, and other support. **Killybegs (Study 2):** - Ancillary employment includes processing as a downstream activity. **Ros an Mhil:** - Ancillary activities in Ros an Mhil include chandlery, fuel, net repair, light engineering, harbour services and ice production.
Italy	*- Not found -*	**Veneto:** - In 2000, 2,996 companies were registered that had undertakings in fisheries aquaculture and/or ancillary activities. - Little companies have undertakings in ancillary activities.(16) **Sicily:** - The fishing industry employs 18,135 people, of which 58% (10,518 people) are employed directly by the sea fishing sector, 8% (1,451 people) in processing, 1% (181 people) in fish farming and 33% (5,985 people) in connected activities such as sales, port services and other. (17) **Sicily and Sardinia:** - Coastal fishing employees 16,350 people. - Processing employs 1,173 people (127 companies). - Vessel construction and repair employs 379 people. - Marine finfish aquaculture employs 1,292 people. - Inland fishing employs 10 people.(18)	**Veneto:** *- Not explained -* **Sicily:** - Ancillary activities include sales, port services and various other services (not specified). **Sicily and Sardinia:** *- Not explained -*
Lithuania	- In 2010, nearly 30 thousand jobs were dependent on the fisheries sector, of which 17 thousand were directly employed by the sector and 7 thousand people were indirectly employed by the sector. The remaining 5 thousand jobs were created in other sectors.(19)	*- Not found -*	**National:** - Direct effect: Shipping and ports, shipbuilding and repair, fishing, aquaculture, energy, marine recreation and tourism. - Indirect effect: Suppliers, manufacturers, business consulting.

Country	National Employment	Regional employment	Definition
Malta	- In 2005, there were 28,000 jobs in coastal tourism, 5,536 jobs at seaports, 3,000 jobs in shipping, 1,763 jobs in shipbuilding, and 1,441 jobs in fishing.(20)	- *Not found* -	**National:** - Fishing employment includes fishing, processing and aquaculture sectors. - Shipbuilding also includes the building of yachts for the tourism sector.
Norway	- 5,900 people are employed in aquaculture. - Ancillary employment in aquaculture is estimated at 21,000.(21)	- *Not found* -	**National:** - Ancillary employment includes transportation, the supply industry, as well as commerce and other spin-off effects (not further specified).
Scotland			**Scotland** - Ancillary staff within companies includes processing, and all other activities not directly related to fish farming itself. - Related employment among other things include cage manufacturers, hauliers, divers (not further specified). **Sound of Mull, Scotland:** - Ancillary employment among other things includes logistics and maintenance (not further specified). **Oban port, Scotland:** - Ancillary employment includes administration (port authority, fisheries office, and training), vessel and gear (production and maintenance), logistics (transport and fuel), and merchants/traders.
Spain	**Study 1:** - 461,611 jobs were associated with the maritime sector. - Number of jobs dependent on the maritime sector was 1,298,955. (22) **Study 2:** - In 2014, 25,125 people are employed in fisheries, 6,043 in aquaculture, 1,691 in mussel aquaculture, and 3,923 in shellfish gathering. - In 2014, 86,917 people are employed in the ancillary industry.(23)	**A Guardia:** - Overall, 144 jobs were created in ancillary activities in 2010 - 15 jobs at shipyards depend on fisheries - 20 jobs at net making facilities depend on fisheries - 2 companies supplying goods to fishing companies - 150 jobs were generated by the marketing sector (sale of fish). - Total employment in fisheries was about 750.(24) **Adra, Almeria, Carboneras , Garrucha, and Roquetas, Andalusia:** - Total employment in the primary sector is 1,024. - Employment in activities ancillary to fishing is 1,058, of which 163 in Adra, 431 in Almeria, 315 in Carboneras, 81 in	**National (Study 1):** - Effects include direct, indirect and induced effects. **National (Study 2):** - *Not explained* - **A Guardia:** - Industries that are dependent on fishing in A Guardia are: net mending, the repair and maintenance of vessels, machinery and equipment, food service and textiles. **Adra, Almeria, Carboneras , Garrucha, and Roquetas, Andalusia:** - *Not explained* - **Algeciras, Barbate, Sanlucar de Barrameda, Cadiz, Conil, Chipiona, El puerto de Santa**

Country	National Employment	Regional employment	Definition
		Garrucha, and 68 in Roquetas.(25) **Algeciras, Barbate, Sanlucar de Barrameda, Cadiz, Conil, Chipiona, El puerto de Santa Maria, La line de la Concepcion, Rota, and Tarifa, Andalusia:** - Total employment in the primary sector is 2,433. - Employment in activities ancillary to fishing is 2,252, of which 130 in Algeciras, 646 in Barbate, 457 in Sanlucar de Barrameda, 64 in Cadiz, 264 in Conil, 118 in Chipiona, 114 in El puerto de Santa Maria, 158 in La line de la Concepcion, 62 in Rota, and 239 in Tarifa.(26) **Andalusia:** - In 2012, employment in fishing and aquaculture is 7,596. - In 2012, employment in ancillary activities is 14,171.(27) **Ayamonte, Huelva, Isla Christina, and Punta Umbria, Andalusia:** - Total employment in the primary sector is 2,579. - Employment in activities ancillary to fishing is 2,323, of which 411 in Ayamonte, 623 in Huelva, 807 in Isla Christina, and 482 in Punta Umbria.(28) **Cambasos:** - Overall, 200 jobs were created in ancillary activities in 2010. - 18 jobs at net making facilities depend on fisheries. - 25 jobs at shipyards depend on fisheries. - Total employment in fisheries was about 900.(29) **Carboneras:** - In 2006, employment in fisheries in 387 (355 on vessels and 32 in aquaculture at 76 companies). - In 2006, employment in related activities is 87 (21 companies), of which 16 in management and administration (4 companies), 4 in supplies (3 companies), 41 in repairs and maintenance (3 companies), and 26 in commercial services (11 companies).(30) **Galicia (Study 1):** - Employment in the primary sector for aquaculture and marine fishing is 22,680. - Employment in processing is 10,542.(31) **Galicia (Study 2):** - Employment in the primary sector was 62,022 in 1997, of which 39,400 in fisheries, 9,200 in shellfish, and 13,422 in aquaculture. - Employment in the ancillary sector was 37,652 in 1997.(32) **Portonovo:** - Overall, 80 jobs were created in ancillary activities in 2010. - 57 jobs at net making facilities depend on fisheries - 20 jobs at shipyards depend on fisheries. - Total employment in fisheries was about	**Maria, La line de la Concepcion, Rota, and Tarifa, Andalusia:** - *Not explained* - **Andalusia:** - Ancillary activities includes processing, management, repair and maintenance, and marketing. **Ayamonte, Huelva, Isla Christina, and Punta Umbria, Andalusia:** - *Not explained* - **Cambasos:** - Industries that are dependent on fishing in Cambasos are: the repair and maintenance of vessels, net mending, machinery and equipment, food service and textiles. **Carboneras:** - *Not explained* - **Galicia (Study 1):** - *Not explained* - **Galicia (Study 2):** - The ancillary sector includes distribution and marketing (auctions, cold storage, shipping, et cetera), freezing, shipyards, dry docks, boat maintenance, naval effects, fishing gear, transport of fish, insurance, financial services, consultancy, et cetera (not further specified). **Portonovo:** - Industries that are dependent on fishing in Portonovo are: net mending, the repair and maintenance of vessels, machinery and equipment, food service and textiles. **Vigo (study 1):** - Industries that are dependent on fishing in Vigo are: oil refining; installation and repair of machinery and equipment; transport and communications; insurance; agricultural and livestock products; financial intermediaries; other food industries; health and social services; the metal and metal products industry; and the textile industry. **Vigo (study 2):** - *See 'regional employment'*-

Country	National Employment	Regional employment	Definition
		500.(33) **Vigo (study 1):** - If the fishing industry would disappear from Vigo, 2,321 full-time jobs would be lost (assuming that these jobs be reassigned to other sectors)(based on 2010 data). - In 2011, there were 52 companies active in naval construction and 37 companies active in processing. - Processing and marketing generate close to 13% of total employment. - 90% of landings go to marketing and processing firms, most of them located in the area. - Total employment in fisheries was about 4,000 in 2010.(34) **Vigo (study 2):** - Total employment in the primary sector is 8,957. - Employment in marketing activities is 12,809. - Employment in processing is 2,508. - Total ancillary employment is 4,273, of which 1,212 in trade and repair, 610 in transport and communications, 423 in real estate and business services, 327 in agriculture, hunting and forestry, 275 in accommodation, 201 in households employing domestic staff, 196 in financial intermediation, 176 in construction, 163 in other services and social activities, 142 in manufacture of transport equipment, 118 in other food industry, 70 in health activities and social services, 54 in metallurgy and metal products, 54 in textiles and clothing, 45 in education, and 208 in other industries.(35)	
United Kingdom	- If the fish catching industry would disappear, 28,691 FTE would be lost.(36)	**Amble, Nothumberland:** - 100 people make a living from fishing, of which 50 in ancillary activities.(37) **Cullivoe, Shetland Island:** - In Shetland, there are 225 jobs supported by the fishing industry. - More than 30 jobs are support by the fishing industry in Yell. - Overall, 235 full-time fishermen were found in Yell.(38) **Dumfries and Galloway:** - In the primary sector 243 people are employed, of which 188 in the large boat fleet, 41 in the small boat fleet, and 14 people in shellfish. - In total, 60 people provide support to the fishing fleet.(39) **Oban port, Scotland:**	**National:** - All effects include direct, indirect, and induced effects. **Amble, Nothumberland:** - Ancillary activities include the provision of gear, electronic equipment, boats, fuel, and ice. **Cullivoe, Shetland Island:** - *Not explained* - **Dumfries and Galloway:** - *Not explained* - **Peterhead:** - *Not explained* - **Western Isles:** - Ancillary employment includes product marketing, gear manufacture and vessel maintenance and repair.

Country	National Employment	Regional employment	Definition
		- Total employment in aquaculture is 35 FTE. - Total employment in ancillary activities is 73.5 FTE (40) **Peterhead:** - In 2012, 350 fishermen work on 65 fishing vessels. - About 189 people were employed in the ancillary sector in 2012, of which 100 people in specialised services for vessel maintenance, 35 people as sales agents, 6 people in ice production, 6 people in storage, 22 people in oil storage, and 20 people in various support organisations.(41) **Scotland:** - Direct employment from aquaculture is 1,898 and 902 additional ancillary jobs within the companies. - Related employment from aquaculture is 4,871.(42) **Sound of Mull, Scotland:** - Total employment in aquaculture is 35 FTE. - Total employment in ancillary activities is 73.5 FTE (43) **Western Isles:** - Total employment in fish catching is 680 FTE. Total employment in aquaculture is 350 FTE (3 companies account for 80% of production). - 200 FTE are employed in processing and 100 FTE in ancillary activities looking at marine fishing. - Looking at aquaculture, 200 FTE are employed in processing and ancillary activities.(44)	

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(25) Ministry of Agricultura (2015).

(26) European Commission (2013). Studies carried out for the Common Fisheries Policy: Lot 3 Socio-Economic dimensions in EU fisheries, A guardia case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/socio_economic_dimension/files/cs-galicia-2-a-guarda-report_en.pdf.

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(39) CCRI (2011). The Social Impacts of England's Inshore Fishing Industry: Final Report.

(40) European Commission (2013). Studies carried out for the Common Fisheries Policy: Lot 3 Socio-economic dimensions in fisheries. Shetland: Cullivoe case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/socio_economic_dimension/files/cs-scotland-2-cullivoe-shetland_en.pdf.

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Figure 83. Results desk research – Employment

III.2 Income in activities ancillary to marine fishing and aquaculture

Figure 84 presents the results of the desk research looking at income in activities ancillary to marine fishing and aquaculture. Results are presented by country, where a distinction has been made between national and regional income data.

Country	National Income	Regional Income	Definition
Europe	- In 2005, 3,932.8 million Euros was generated in the primary sector, 4,636.9 million Euros in processing, 1,642.8 million Euros in aquaculture, and 764.6 million Euros in ancillary activities.(1)		**National:** - Fishing sector consists of three sectors: the primary sector, processing, and ancillary activities. - Ancillary activities are not specified, other than activities directly related to fisheries and aquaculture.

Country	National Income	Regional Income	Definition
France	*- Not found -*	**Sete:** - In 2007, total income from the fisheries sector is 266 million Euros, of which 33 million Euros in aquaculture, 36 million Euros in fishing, 192 million Euros in processing, and 1 million Euros in ancillary activities. - In 2007, total value added is 61 million Euros, of which 23 million Euros in aquaculture, 22 million Euros in fisheries, 16 million Euros in processing, and 0 million Euros in ancillary activities.(2)	**Sete:** *- Not explained -*
Ireland	- The Irish fishing industry contributes 380 Million Euros to the Irish economy each year (including primary sector, processing, and the ancillary sector).(3)	**Castletownbere**: - In 2010, the landing value was 50.4 million Euros. - In total, the total income of the ancillary sector was 46.2 million Euros in 2010, of which 41.5 million Euros in fuel supplies, 2.7 million Euros in chandlery, 0.4 million Euros in fleet support, 0.6 million Euros in harbour services, and 1 million Euros in Engineering.(4) **Killybegs (study 1):** - In 2009, the landing value was 71.61 million Euros. - In 2008, the production value of aquaculture was estimated at 11.3 million Euros. - In total, the total income of the ancillary sector was 33.18 million Euros in 2009, of which 1.28 million Euros in chandlery, 3.4 million Euros in fuel supplies, 11.38 million Euros in net making, 2.05 million Euros in electrical/refrigeration, 5.08 million Euros in engineering, 2.71 million Euros in hydraulics, 3.43 million Euros in marine agents, 3.15 million Euros in cargo handlers, and 0.70 million Euros in other support.(5) **Killybegs (study 2):** - Total income from fisheries is 250 million Euros (includes the primary sector, processing, and all other related sectors. - Aquaculture generated 14 million Euros (5.3% of total income) in income and fisheries generate 72 million Euros (27.1% of total income) in income in 2009. - In 2009, 12.5% of the total income in Killybegs is generated by ancillary services, or 33 million Euros.(6) **Ros an Mhil:** - In 2011, total landing value of fishing activity was 9.9 million Euros. - In 2011, total income from primary sector in aquaculture was 18.4 million Euros (16.3 million from finfish and 2 million Euros from shellfish).	**National:** *- Not explained -* **Killybegs (study 1):** - Ancillary activities include chandlery, fuel supplies, net makers, electrical/refrigeration, engineering, hydraulics, marine agents, cargo handlers, and other support. **Killybegs (study 2):** - Ancillary services are defined as support functions such as net making, electrical/refrigeration, and engineering (not further specified). **Ros an Mhil:** - Ancillary activities in Ros an Mhil include chandlery, fuel, net repair, light engineering, harbour services and ice production.

Country	National Income	Regional Income	Definition
		- In 2011, income in ancillary activities was estimated at 2.2 million Euros (most of the income comes from fuel).(7)	
Lithuania	- In 2010, total income generated by the industry was 13 333 million Euros*, of which 10 666 million Euros* comes from businesses that are directly or indirectly related to the fishing sector.(8) *Based on an exchange rate of 0.30 Euro/LTL	*- Not found -*	**National:** - Direct effect: Shipping and ports, shipbuilding and repair, fishing, aquaculture, energy, marine recreation and tourism. - Indirect effect: Suppliers, manufacturers, business consulting.
Spain	- Value of production in the primary sector was equal to 52.389 million Euros, generating a GVA of 26.873 million Euros. - Total economic impact of the maritime sector is 186.083 million Euros, generating a GVA of 68.179 million Euros.(9)	**Carboneras:** - In 2009, GDP contribution of fisheries is 2.5 million Euros, of which 1.3 million comes from fisheries, 0.5 million from aquaculture, 0 million from processing, and 0.7 million from ancillary and marketing.(10) **Vigo:** - When fishing activity would completely disappear from Vigo, 980 million of Income would be lost.(11)	**National:** - Effects include direct, indirect and induced effects. **Carboneras:** *- Not explained -* **Vigo:** - Ancillary employment includes: trade and repair, transport and communications, real estate and business services, agriculture, hunting and forestry, accommodation, households employing domestic staff, financial intermediation, construction, other services and social activities, manufacture of transport equipment, other food industry, health activities and social services, metallurgy and metal products, textiles and clothing, education, other industries.
United Kingdom	- If the fish catching industry would disappear, GDP would decline with 672.7 million Pounds.(12)	**Rye, Sussex:** - The fishing industry contributes 1 million Pounds to the local economy directly through income and related inputs.(13)	**National:** - All effects include direct, indirect, and induced effects. **Rye, Sussex:** - Ancillary activities include the provision of gear, electronic equipment, boats, fuel, and ice.

(1) European Parliament (2007). Regional dependency on fisheries. Retrieved from http://www.europarl.europa.eu/RegData/etudes/etudes/join/2007/379204/IPOL-PECH_ET(2007)379204_EN.pdf.

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(12) Seafish (Unkown). The economic impacts of the UK sea fishing and fish processing sectors: An input-output analysis.

(13) CCRI (2011). The Social Impacts of England's Inshore Fishing Industry: Final Report.

Figure 84. Results desk research – Income

III.3 Other socio-economic data

In some cases, studies also reported other socio-economic data, such as gender, age, education level, et cetera. All the information that was collected during the desk research is presented in Figure 85. Overall, a limited amount of studies presents this kind of data.

Country	National other socio-economic data	Regional other socio-economic data	Definition
Ireland	*- Not found -*	**Killybegs:** - Almost all labour is male, although some administrative functions are carried out by women, and almost all activity is related to locally-based vessels, although some visiting vessels are serviced by the ancillary sub-sector.(1)	**Killybegs:** - Ancillary activities include chandlery, fuel supplies, net makers, electrical/refrigeration, engineering, hydraulics, marine agents, cargo handlers, and other support.
Italy	*- Not found -*	**Sicily and Sardinia:** - 96% of the people working in vessel construction and repair are male.(2)	**Sicily and Sardinia:** *- Not applicable -*
Spain	- In 2014, 3.9% of the people active in fisheries is female, 43.7% in aquaculture, 33.1% in mussel aquaculture, and 71.9% in shellfish gathering. - In 2014, 42.5% of the people active in ancillary activities is female.(3)	**A Guardia:** **-** In general, fishermen only have a primary education. - There is a long tradition of activities related to fishing, processing (selling of fish), net-makers and shipyards, where there is a high degree of family involvement in these activities. - Net makers are all women with an average age of 45 years. - Family members often work in the marketing sector; i.e. selling fish on local markets as well as selling fish to retailers, food shops, and wholesalers.(4) **Cambasos:** - In general, fishermen only have a primary education. - There is a long tradition of activities related to fishing, aquaculture, processing, marketing (selling of fish), net-	**National:** *- Not explained -* **A Guardia:** *- Not applicable -* **Cambasos:** *- Not applicable -* **Portonovo:** *- Not applicable -* **Vigo:** - Industries that are dependent on fishing in Vigo are: oil refining; installation and repair of machinery and equipment; transport and communications; insurance; agricultural and

Country	National other socio-economic data	Regional other socio-economic data	Definition
		makers and shipyards, where there is a high degree of family involvement in these activities. - Net makers are all women with an average age of 40 years. Women engaging in these kind of activities are usually wives of fishermen. - Fishermen have moved into mussel farming, due to a decline in catches. - Wives and daughters of fishermen often engage in processing activities, marketing activities and often sell the fish on town's markets.(5) **Carboneras:** - 7% of employment in fisheries, aquaculture and ancillary industries is women. **Portonovo:** - Net makers are all women with an average age of 45 years. - High degree of family involvement, where family members perform net mending activities and marketing activities, where the wives of fishermen often sell fish in town's markets. - Sons are often part of the fishing crew and replace the father when he retires.(7) **Vigo:** - In general, fishermen only have a primary education. Over the past few years training has been increasing, especially among younger people. - There is little competition between ancillary activities. - Scale economies and synergies exist for fisheries, processing and marketing (sale of fish). - Participation of at least one household member in processing and marketing activities (sale of fish) is likely. - 17% of the interviewed fishermen explained that their wives have paid employment in processing.(8)	livestock products; financial intermediaries; other food industries; health and social services; the metal and metal products industry; and the textile industry.
United Kingdom	*- Not found -*	**Cullivoe, Shetland Island:** - All interviewed fishermen had higher qualifications than needed looking at their vessels. Meaning, they were are qualified to skipper or crew larger vessels. - Children of fishermen are less likely to join the fishing industry due to low income levels. - There is no proof of family involvement in the industry. In Yell, all ancillary jobs were held by other households. - Land-based ancillary industries remain important employers within Cullivoe and Yell.(9)	**Cullivoe, Shetland Islands:** *- Not explained -*

(1) BIM (2010). Assessment of the status, development and diversification of fisheries-dependent communities.

(2) Megapesca (2015). Italy I3 Socio-economic profile. Retrieved from http://www.megapesca.com/fishdep/IT3/I3Profile.html.

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(4) European Commission (2013). Studies carried out for the Common Fisheries Policy: Lot 3 Socio-Economic dimensions in EU fisheries, A guardia case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/socio_economic_dimension/files/cs-galicia-2-a-guarda-report_en.pdf.

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(6) European Commission (2010). Assessment of the status, development and diversification of fisheries-dependent communities, Carboneras case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/regional_social_economic_impacts/carboneras_en.pdf.

(7) European Commission (2013). Studies carried out for the Common Fisheries Policy: Lot 3 Socio-Economic dimensions in EU fisheries, Portonovo case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/socio_economic_dimension/files/cs-galicia-5-portonovo-report_en.pdf.

(8) European Commission (2013). Studies carried out for the Common Fisheries Policy: Lot 3 Socio-Economic dimensions in EU fisheries, Vigo case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/socio_economic_dimension/files/cs-galicia-6-vigo-report-template_en.pdf.

(9) European Commission (2013). Studies carried out for the Common Fisheries Policy: Lot 3 Socio-economic dimensions in fisheries. Shetland: Cullivoe case study report. Retrieved from http://ec.europa.eu/fisheries/documentation/studies/socio_economic_dimension/files/cs-scotland-2-cullivoe-shetland_en.pdf.

Figure 85. Results desk research - Other socio-economic data

III.4 Multipliers

Multipliers measure the change in a (local) economy from a change in a given sector. In other words, when income or employment increases with one unit in one sector, the multiplier measures to total effect of that increase in the (local) economy[137,138]. A benefit of this method is that, unlike with income and employment in absolute terms, a multiplier allows for a comparison between countries and regions. Using the data on employment and income presented in the previous tables, these multipliers can be calculated. Furthermore, some studies only reported on multipliers and not on employment and/or income in absolute terms. This paragraph presents an overview of all the multipliers that were either found or calculated during the desk research.

Before presenting and discussing the results, it is important to give some background about multipliers. Overall, there are two types of multipliers: Type I multipliers and Type II multipliers and these can be calculated both for income (i.e. output multiplier)[139] and employment (i.e. employment multiplier). Type I and Type II refers to the effects that are taken into account when calculating the multipliers. Basically, there are three types of effects that can be measured when a change in a given sector is observed: i) direct effects, ii) indirect effects, and iii) induced effects, where direct effects refer to the effect in the sector with the initial increase (in this case fisheries or aquaculture), indirect effects refer to the effect in other sectors (for instance shipyards, net making facilities, et cetera) and induced effects refer to increased spending by households based on income earned from the direct and indirect effects[140, 141, 142].

In the end, the Type I multiplier is calculated by dividing the indirect effect by the direct effect and the Type II multiplier is calculated by summing the indirect and induced effects and dividing it by the direct effect (Figure 86 explains the interpretation of multipliers).

Interpretation of multipliers

Interpretation of an employment multiplier of 0.50 is as follows:

> *Type I multiplier: An increase of employment of 1 in one sector (direct effect), results in an increase of 0.50 in other sectors (indirect effect).*
>
> *Type II multiplier: An increase of employment of 1 in one sector (direct effect), results in a further increase in employment in the entire economy of 0.50 (indirect and induced effect.*

Interpretation of an income multiplier of 0.50 is as follows:

> *Type I multiplier: A 1-Euro increase in income in one sector (direct effect), generates 0.50 in other sectors (indirect effect).*
>
> *Type II multiplier: A 1-Euro increase in income in one sector (direct effect), generates 0.50 additional income in the economy (indirect and induced effect).*

Figure 86. Interpretation of multipliers

There are roughly two methods to calculate multipliers. The first method is using Input-Output analysis (I-O analysis). I-O analysis is used to estimate economy-wide effects by looking at the output in different sectors and their inter-sector relationships[143]. This is a quantitative approach to calculate multipliers and relies on data on generated output in the sector of the initial increase as well as generated output in all sectors with

137 https://www.bea.gov/papers/pdf/WP_IOMIA_RIMSII_020612.pdf.

138 http://ec.europa.eu/fisheries/documentation/studies/socio_economic/final_report_en.pdf.

139 In some literature, income is explained as income from employment (i.e. number of FTE times the income per FTE). In this study, income is defined as the total output generated in a sector.

140 http://www.coastal-saf.eu/output-step/pdf/Specification%20sheet%20I_O_final.pdf

141 https://www.bea.gov/papers/pdf/WP_IOMIA_RIMSII_020612.pdf.

142 http://ec.europa.eu/fisheries/documentation/studies/socio_economic/final_report_en.pdf.

143 Purchasing sectors are often not the selling sectors. Meaning, products from one sector can be used to sell products in other sectors. In this way, when an increase in output is observed in one sector, due to the inter-sector relationship, output is might also be raised in other sectors. Looking at for instance aquaculture, if more fish is produced, most likely more feed will need to be produced too. Hence, output increases in both sectors.

which this sector has a relationship. In the end, I-O analysis is primarily focused on output and the employment multiplier is calculated by looking at the number of FTE per unit of output. The second method is that output and employment in sectors is determined using case studies, interviews, community consultations, and surveys. This method relies on estimations from experts from the industry and is therefore less robust than I-O analysis. However, I-O analysis relies on a large amount of data, preferably from one source in one unit on the same time period. In practice, this is hard to realise and therefore the second method has been applied throughout studies found during the desk research[144, 145, 146].

Figure 87 presents all the multipliers that have been collected and calculated as a result of the desk research. This study focuses on the effects of an increase in output or employment in marine fishing and aquaculture on the activities directly related to these sectors up to the first point of scale. This is a narrow scope that leaves room for interpretation looking at which activities are defined as activities directly related to marine fishing and aquaculture as well as the definition of the first point of sale. Therefore, some important facts need to be taken into consideration when looking at the multipliers presented in Figure 87:

- **Indirect vs. induced effects:** Type I and Type II multipliers are used interchangeably between studies and studies are often not transparent on which effects they have taken into account when calculating the multiplier.
- **Definition of indirect effects:** The studies that focus on indirect effects often have a different definition of indirect effects. In this study, indirect effects only concerns organisations that provide services that are directly related to marine fishing and aquaculture and up to the first point of sale. Many studies – if not all – have used different definitions. In addition, different definitions have been used between studies themselves, meaning that one has to be cautious when comparing multipliers from different studies. Studies are also not always transparent on what definition they applied.
- **Employment vs. FTE:** Employment multipliers can be calculated using employment in FTE and employment including full-time, part-time and seasonal workers. Both methods can result in multipliers that are significantly different in size, since multipliers based on FTE are always lower than multipliers based on overall employment.

In the main report, only the multipliers with a similar definition as used during this study are taken info account for the final analysis. Chapter 3 and 4 of the main report includes those multipliers from the desk research which are included in the region analysis of this study.

Country	National multiplier	Regional multiplier	Definition
Global	- Per fisherman or fish farmer 3 to 4 people work in ancillary activities.(1)		**National:** - The ancillary sector contains activities such as processing, packaging, marketing and distribution, manufacturing of fish-processing equipment, net and gear making, ice production and supply, boat construction and maintenance, research and administration. - Each jobholder provides for 3 people.
Belgium	- Per fishermen or fish farmer, 6.67 people are active in ancillary activities.(2)	**Brugge:** - Per fisherman, 1.00 people work in the ancillary sector.(3) **Oostende:** - Per fisherman, 0.40 people work in the ancillary sector.(3)	**National:** - *Not explained* - **Brugge:** - Ancillary employment includes processing as a downstream activity. **Oostende:** - Ancillary employment includes processing as a downstream activity.

144 http://www.coastal-saf.eu/output-step/pdf/Specification%20sheet%20I_O_final.pdf

145 https://www.bea.gov/papers/pdf/WP_IOMIA_RIMSII_020612.pdf.

146 http://ec.europa.eu/fisheries/documentation/studies/socio_economic/final_report_en.pdf.

Country	National multiplier	Regional multiplier	Definition
Denmark	*- Not found -*	**Bornholm (study 1):** - Per fisherman, 0.43 people work in the ancillary sector.(4) **Bornholm (study 2):** - Per fisherman, 0.70 people work in the ancillary sector. - Per fisherman, 0.26 people work in upstream activities. - Per fisherman, 0.44 people work in downstream activities.(3) **Esbjerg:** - Per fisherman, 0.46 people work in the ancillary sector.(5) **Ribe:** - Per fisherman, 0.88 people work in the ancillary sector. - Per fisherman, 0.43 people work in upstream activities. - Per fisherman, 0.45 people work in downstream activities.(3)	**Bornholm (study 1):** - Ancillary activities include shipyards/boat builders, net lofts/gear manufacturers, engine repair/maintenance, electricians, electronics, and industry service. **Bornholm (study 2):** - Ancillary employment includes processing as a downstream activity. **Esbjerg:** - Ancillary activities include shipyards/boat builders, net lofts/gear manufacturers, engine repair/maintenance, electronics and communication, and industry service. **Ribe:** - Ancillary employment includes processing as a downstream activity.
France	*- Not found -*	**Auray and Vannes:** - Per fisherman, 0.24 people are employed in ancillary activities (including upstream, downstream, and support employment).- Per fishermen, 0.05 people work upstream.- Per fisherman, 0.13 people work downstream.- Per fisherman, 0.06 people work in support activities.(6) **Boulogne Sur Mer:** - Per fisherman, 1.9 people work in the ancillary sector.- Per fisherman, 0.5 people work in upstream activities.- Per fisherman, 1.4 people work in downstream activities.(3) **Douarnenez:** - Per fisherman, 5.6 people work in the ancillary sector.- Per fisherman, 0.3 people work in upstream activities.- Per fisherman, 5.3 people work in downstream activities.(3) **Guilvinec:** - Per fisherman, 1.5 people work in the ancillary sector.- Per fisherman, 0.3 people work in upstream activities.- Per fisherman, 1.2 people work in downstream activities.(3) **Port en Bessin:** - Per fisherman, 2.2 people work in the ancillary sector.- Per fisherman, 0.4 people work in upstream activities.- Per fisherman, 1.8 people work in downstream	**Auray and Vannes:** - Ancillary activities are divided into three categories: upstream activities, downstream activities, and support activities.- Upstream activities include construction, ship repair and related activities, fishing landing, fuel and oil, insurance, auction, and management.- Downstream activities include fishmongers, fishmongers and wholesalers, supermarkets, consumers, and restaurants.- Support activities include local authorities, banks, social services, maritime affairs, general council, and other services. **Boulogne Sur Mer:** - Ancillary employment includes processing as a downstream activity. **Douarnenez:** - Ancillary employment includes processing as a downstream activity. **Guilvinec:** - Ancillary employment includes processing as a downstream activity. **Port en Bessing:** - Ancillary employment includes processing as a downstream activity. **Sete:***- Not explained -*

Country	National multiplier	Regional multiplier	Definition
		activities.(3) **Sete:** - Per fishermen or fish farmer, 0.008 people are active in the ancillary industry.- Per Euro generated in aquaculture and fisheries, 0.14 Euro is generated in ancillary activities. (7)	
Germany	*- Not found -*	**Bremerhaven:** - Per fisherman, 0.40 people work in the ancillary sector.(3) **Sassnitz on Rugen:** - Per fisherman, 0.65 people work in the ancillary sector.(3)	**Bremerhaven:** - Ancillary employment includes processing as a downstream activity. **Sassnitz on Rugen:** - Ancillary employment includes processing as a downstream activity.
Greece	*- Not found -*	**Euboea:** **-** Per fisherman, 0.40 people work in the ancillary sector. - Per fisherman, 0.23 people work in upstream activities. - Per fisherman, 0.17 people work in downstream activities.(3) **Kevala:** - Per fisherman, 0.42 people work in the ancillary sector. - Per fisherman, 0.21 people work in upstream activities. - Per fisherman, 0.20 people work in downstream activities.(3)	**Euboea:** - Ancillary employment includes processing as a downstream activity. **Kevala:** - Ancillary employment includes processing as a downstream activity.

Country	National multiplier	Regional multiplier	Definition
Ireland	**Study 1:** - Per fisherman or fish farmer, 0.15 people are employed in the ancillary sector.(8) **Study 2:** - Per fisherman or fish farmer, 0.33 people are active in ancillary activities.(9) **Study 3:** - Per fishermen or fish farmer, 0.33 people are active in ancillary activities.(10) **Study 4:** **-** Per tonne extra in aquaculture, 22.6 ancillary jobs would be created.- Per 1 million Euro increase in sales, 3.7 ancillary jobs would be created.(11)	**Castletownbere:**- Per fisherman, 0.13 people are active in the ancillary sector.- Per Euro of fish landed, 0.92 Euro is generated in the ancillary sector.(12) **Killybegs (study 1):**- Per fisherman or fish farmer, 1.11 people are active in the ancillary sector.- Per Euro of fish landed or produced, 0.40 Euro is generated in the ancillary sector.(13) **Killybegs (study 2):** - Per Euro of income generated in aquaculture or fisheries, 0.13 Euro is generated in ancillary services.(14) **Killybegs (study 3):** - Per fisherman, 5.01 people work in the ancillary sector (only includes downstream activities).(3) **Ros an Mhil:** - Per fisherman or fish farmer, 0.01 people are active in the ancillary sector.- Per Euro income in the primary sector (fishing and aquaculture), 0.08 Euro is generated in ancillary industries.(15) **Rossaveal:** - Per fisherman, 1.05 people work in the ancillary sector (only includes downstream activities).(3)	**National (study 1):**- Ancillary employment among other things includes net making, chandlery, vessel repair, marketing, transport, engineering and refrigeration (not further specified).**National (study 2):**- *Not explained* -**National (study 3):**- *Not explained* - **National (study 4):**- Ancillary employment includes: Agriculture, business services, financial intermediation, seafood processing, food processing, hotel & restaurants, insurance and pensions, Petroleum, Transportation, and other sectors. **Castletownbere:** - Ancillary activities include vessel agents, fuel suppliers, chandlers, net repair, engineering (mechanical, electrical, hydraulic, refrigeration), fleet support (representation, management) and harbour services (ice, pilotage, synchro-lift, etc.). **Killybegs (study 1):** - Ancillary activities include chandlery, fuel supplies, net makers, electrical/refrigeration, engineering, hydraulics, marine agents, cargo handlers, and other support. **Killybegs (study 2):** - Ancillary services are defined as support functions such as net making, electrical/refrigeration, and engineering (not further specified). **Killybegs (study 3):** - Ancillary employment includes processing as a downstream activity. **Ros an Mhil:** - Ancillary activities in Ros an Mhil include chandlery, fuel, net repair, light engineering, harbour services and ice production. **Rossaveal:** - Per fisherman, 1.05 people work in the ancillary sector (only includes downstream activities).
Italy	*- Not found -*	**Sicily:** - Per fisherman or fish farmer, 0,56 people are employed in the ancillary sector.(16) **Sicily and Sardinia:** - Per fisherman or fish farmer, 0.02 people work in vessel construction and repair (includes coast fishing, marine finfish aquaculture and inland fishing).(3)	**Sicily:** - Ancillary activities include sales, port services and various other services (not specified). **Sicily and Sardinia:** *- Not explained -*

Country	National multiplier	Regional multiplier	Definition
Lithuania	- One statistical employee of a company in the sector created an additional 0.75 jobs in the economy.(17)	*- Not found -*	**National:** - Direct effect: Shipping and ports, shipbuilding and repair, fishing, aquaculture, energy, marine recreation and tourism. - Indirect effect: Suppliers, manufacturers, business consulting.
Norway	- Per fish farmer, 3.56 people are employed indirectly via the aquaculture industry.(18)	*- Not found -*	**National:** - Ancillary employment includes transportation, the supply industry, as well as commerce and other spin-off effects (not further specified).
Portugal	*- Not found -*	**Aveiro:** - Per fisherman, 1.61 people work in the ancillary sector. - Per fisherman, 0.16 people work in upstream activities. - Per fisherman, 1.45 people work in downstream activities.(3) **Fig. Foz:** - Per fisherman, 1.38 people work in the ancillary sector. - Per fisherman, 0.18 people work in upstream activities. - Per fisherman, 1.2 people work in downstream activities.(3) **Lourinha:** - Per fisherman, 1.97 people work in the ancillary sector. - Per fisherman, 0.10 people work in upstream activities. - Per fisherman, 1.87 people work in downstream activities.(3) **Madeira - Machico:** - Per fisherman, 1.25 people work in the ancillary sector. - Per fisherman, 0.20 people work in upstream activities. - Per fisherman, 1.05 people work in downstream activities.(3) **Mareira con de Lobos:** - Per fisherman, 0.44 people work in the ancillary sector. - Per fisherman, 0.06 people work in upstream activities. - Per fisherman, 0.38 people work in downstream activities.(3) **Matosinhos:** - Per fisherman, 2.19 people work	**Applicable to all regional multipliers:** - Ancillary employment includes processing as a downstream activity.

Country	National multiplier	Regional multiplier	Definition
		in the ancillary sector. - Per fisherman, 0.24 people work in upstream activities. - Per fisherman, 1.95 people work in downstream activities.(3) **Olhao:** - Per fisherman, 1.67 people work in the ancillary sector. - Per fisherman, 0.05 people work in upstream activities. - Per fisherman, 1.45 people work in downstream activities.(3) **P. Varzim:** - Per fisherman, 2.57 people work in the ancillary sector. - Per fisherman, 0.10 people work in upstream activities. - Per fisherman, 2.47 people work in downstream activities.(3) **Peniche:** - Per fisherman, 2.48 people work in the ancillary sector. - Per fisherman, 0.10 people work in upstream activities. - Per fisherman, 2.38 people work in downstream activities.(3) **Sesimbra:** - Per fisherman, 0.38 people work in the ancillary sector. - Per fisherman, 0.11 people work in upstream activities. - Per fisherman, 0.27 people work in downstream activities.(3) **Setubal:** - Per fisherman, 1.68 people work in the ancillary sector. - Per fisherman, 0.23 people work in upstream activities. - Per fisherman, 1.45 people work in downstream activities.(3) **V. Castello:** - Per fisherman, 1.62 people work in the ancillary sector. - Per fisherman, 0.17 people work in upstream activities. - Per fisherman, 1.45 people work in downstream activities.(3) **V. Conde:** - Per fisherman, 1.50 people work in the ancillary sector. - Per fisherman, 0.11 people work in upstream activities. - Per fisherman, 1.39 people work in downstream activities.(3) **V.R.S. Antonio:** - Per fisherman, 6.75 people work in the ancillary sector. - Per fisherman, 0.16 people work in upstream activities. - Per fisherman, 6.59 people work in downstream activities.(3)	

Country	National multiplier	Regional multiplier	Definition
Spain	**Study 1:** - Per fisherman or fish farmer, 2.36 people work in the ancillary industry (including fisheries, aquaculture, mussel aquaculture, and shellfish gathering).(19) **Study 2:** - Per fisherman or fish farmer, 2.81 people work in other sectors. - Per Euro income generated in the primary sector, 3.55 Euro is generated in the economy. - Per Euro GVA generated in the primary sector, 2.54 Euro of GVA is generated in the economy.(20)	**A Guardia:** - Per fisherman, 0.19 people are active in other industries.(21) **Adra, Almeria, Carboneras , Garrucha, and Roquetas, Andalusia:** - Per fisherman, 1.03 people work in the ancillary sector.(22) **Algeciras, Barbate, Sanlucar de Barrameda, Cadiz, Conil, Chipiona, El puerto de Santa Maria, La line de la Concepcion, Rota, Tarifa, Andalusia:** - Per fisherman, 0.93 people work in the ancillary sector.(22) **Andalusia (study 1):** - Per fisherman, 0.09 people work in the ancillary sector.(3) **Andalusia (study 2):** Per fisherman or fish farmer, 1.87 people are active in ancillary activities.(23) **Asturias:** - Per fisherman, 0.84 people work in the ancillary sector. - Per fisherman, 0.08 people work in upstream activities. - Per fisherman, 0.76 people work in downstream activities.(3) **Ayamonte, Huelva, Isla Christina, Punta Umbria, Andalusia:** - Per fisherman, 0.90 people work in the ancillary sector.(22) **Basque county:** - Per fisherman, 1.03 people work in the ancillary sector. - Per fisherman, 0.29 people work in upstream activities. - Per fisherman, 0.74 people work in downstream activities.(3) **Cadiz:** - Per fisherman, 0.10 people work in the ancillary sector.(3) **Caleta de Velez, Estepona, Fuengirola, Malaga, Marbella, Andalusia:** - Per fisherman, 1.00 people work in the ancillary sector.(22)	**National (study 1):** - *Not explained* - **National (study 2):** - Effects include direct, indirect and induced effects. **A Guardia:** - Industries that are dependent on fishing in A Guardia are: net mending, the repair and maintenance of vessels, machinery and equipment, food service and textiles. **Adra, Almeria, Carboneras , Garrucha, and Roquetas, Andalusia:** - *Not explained* - **Algeciras, Barbate, Sanlucar de Barrameda, Cadiz, Conil, Chipiona, El puerto de Santa Maria, La line de la Concepcion, Rota, Tarifa, Andalusia:** - *Not explained* - **Andalusia (study 1):** - Ancillary employment includes processing as a downstream activity. **Andalusia (study 2):** - Ancillary activities includes processing, management, repair and maintenance, and marketing. **Asturias:** - Ancillary employment includes processing as a downstream activity. **Ayamonte, Huelva, Isla Christina, Punta Umbria, Andalusia:** - *Not explained* - **Basque county:** - Ancillary employment includes processing as a downstream activity. **Cadiz:** - Ancillary employment includes processing as a downstream activity. **Caleta de Velez, Estepona, Fuengirola, Malaga, Marbella, Andalusia:** - *Not explained* - **Cambasos:** - Industries that are dependent on fishing in Cambasos are: the repair and maintenance of vessels, net mending, machinery and equipment, food service and textiles. **Carboneras:** - *Not explained* - **Galicia (study 1):**

Country	National multiplier	Regional multiplier	Definition
		Cambasos: - Per fisherman, 0.22 people are active in other industries.(24) **Carboneras:** - Per fishermen of fish farmer, 0.22 people are active in ancillary activities, of which 0.04 in management and administration, 0.01 in supplies, 0.11 in repairs and maintenance, and 0.07 in commercial services. - Per Euro income in fisheries, 0.28 Euro is generated in ancillary and marketing activities.(25) **Galicia (study 1):** - For every million Euros produced, 17.6 jobs will be created in the economy: 10.6 in the primary sector, 5 in indirect activities, and 1.6 due a overal increase in demand (induced effect).(26) **Galicia (study 2):** - Per fisherman or fish farmer, 0.61 people work in the ancillary sector.(27) **Galicia (study 3):** - Per fisherman, 0.11 people work in the ancillary sector (only upstream activities have been included).(3) **Galicia (study 4):** - Per fisherman, 0.55 people work in the ancillary sector. - Per fisherman, 0.14 people work in upstream activities. - Per fisherman, 0.41 people work in downstream activities.(3) **Huelva:** - Per fisherman, 0.07 people work in the ancillary sector.(3) **Portonovo:** - Per fisherman, 0.16 people are active in other industries.(28) **Vigo (study 1):** - Per fisherman, 0.48 people are active in ancillary activities.(29) **Vigo (study 2):** - Per fisherman, 0.58 FTE are active in other industries. (30) **Vigo (study 3):** - Per fisherman, 1.87 people will be generated in the local economy (including direct, indirect and induced effects).(31)	- *Not explained* - **Galicia (study 2):** - The ancillary sector includes distribution and marketing (auctions, cold storage, shipping, et cetera), freezing, shipyards, dry docks, boat maintenance, naval effects, fishing gear, transport of fish, insurance, financial services, consultancy, et cetera (not further specified). **Galicia (study 3):** - Ancillary employment includes processing as a downstream activity. **Galicia (study 4(:** - Ancillary employment includes processing as a downstream activity. **Huelva:** - Ancillary employment includes processing as a downstream activity. **Portonovo:** - Industries that are dependent on fishing in Portonovo are: net mending, the repair and maintenance of vessels, machinery and equipment, food service and textiles. **Vigo (study 1):** - Ancillary employment includes: trade and repair, transport and communications, real estate and business services, agriculture, hunting and forestry, accommodation, households employing domestic staff, financial intermediation, construction, other services and social activities, manufacture of transport equipment, other food industry, health activities and social services, metallurgy and metal products, textiles and clothing, education, other industries. **Vigo (study 2):** - Industries that are dependent on fishing in Vigo are: oil refining; installation and repair of machinery and equipment; transport and communications; insurance; agricultural and livestock products; financial intermediaries; other food industries; health and social services; the metal and metal products industry; and the textile industry. **Vigo (study 3):** - *Not explained* -

Country	National multiplier	Regional multiplier	Definition
Sweden	*- Not found -*	**Four city region:** - Per fisherman, 0.50 people work in the ancillary sector.(3) **Rymattyla,Taivassao Velkua:** - Per fisherman, 0.27 people work in the ancillary sector (only upstream activities have been included).(3) **West Goataland:** - Per fisherman, 0.45 people work in the ancillary sector.(3)	**Four city region:** - Ancillary employment includes processing as a downstream activity. **Rymattyla,Taivassao Velkua:** - Ancillary employment includes processing as a downstream activity. **West Goataland:** - Ancillary employment includes processing as a downstream activity.
United Kingdom	**Study 1:** - An increase of the demand for fish of 1 million Pounds, will increase the income from fisheries with 3.47 million Pounds (includes both direct, indirect, and induced effects). - An increase of the demand for fish of 1 million Pound, will increase employment with 24.7 FTE (includes both direct, indirect, and induced effects).(32) **Study 2:** - Per fisherman, 3.21 people work in the ancillary sector (includes direct, indirect, and induced effects).(33)	**Amble, Northumberland:** **-** Per fishermen, 1.00 people work in the ancillary sector.(34) Cullivoe, Shetland Islands: - In Yale, per fisherman, 0.13 people are active in other industries.(35) **Dumfries and Galloway:** - Per fisherman, 0.25 people were employed in the ancillary **sector.(36)** **Grimsby:** - Per fisherman, 1.08 people work in the ancillary sector. - Per fisherman, 0.33 people work in upstream activities. - Per fisherman, 0.75 people work in downstream activities.(3) **Newlyn:** - Per fisherman, 0.91 people work in the ancillary sector. - Per fisherman, 0.30 people work in upstream activities. - Per fisherman, 0.61 people work in downstream activities.(3) **North East Scotland:** - Per fisherman, 1.38 people work in the ancillary sector. - Per fisherman, 0.59 people work in upstream activities. - Per fisherman, 0.79 people work in downstream activities.(3) **Oban port, Scotland:** - Per fisherman, 0.35 people are active in ancillary activities.(37) **Peterhead:** - Per fisherman, 0.54 people were employed in the ancillary sector.(38)	**Study 1:** - Ancillary activities among other things includes the following sectors: shipbuilding and repair, ancillary transport services, cove ovens, refined petroleum & nuclear fuel, other textiles, insurance and pension funds, electric motors and generators, other business services, retail distribution, meat processing, and plastic products (83.5% of total international purchases). **Study 2:** - Per fisherman, 3.21 people work in the ancillary sector (includes direct, indirect, and induced effects). **Amble, Northumberland:** - Ancillary activities include the provision of gear, electronic equipment, boats, fuel, and ice. **Cullivoe, Shetland Islands:** - *Not explained* - **Dumfries and Galloway:** - *Not explained* - **Grimsby:** - Ancillary employment includes processing as a downstream activity. **Newlyn:** - Ancillary employment includes processing as a downstream activity. **North East Scotland:** - Ancillary employment includes processing as a downstream activity. Oban port, Scotland: - Ancillary employment includes administration (port authority, fisheries office, and training), vessel and gear (production and maintenance), logistics (transport and fuel), and merchants/traders. **Peterhead:** - *Not explained* - **Scotland (study 1):** - Ancillary activities among other sectors includes the following sectors: shipbuilding and repair, oil process, nuclear fuel, transport services, other textiles, other business services, banking, soft drinks, meat processing, retail distribution, and plastic products (86,97% of total international purchases). **Scotland (study 2):** - *Not explained* - **Scotland (study 3):**

Country	National multiplier	Regional multiplier	Definition
		Scotland (study 1): - An increase of the demand for fish of 1 million Pounds, will increase the income from fisheries with 2.13 million Pounds (includes both direct, indirect, and induced effects). - An increase of the demand for fish of 1 million Pound, will increase employment with 17.9 FTE (includes both direct, indirect, and induced effects).(39) **Scotland (study 2):** - Per fish farmer, 2.6 people work in related and ancillary industries.(40) **Scotland (study 3:** - Per fish farmer, 3.04 people are active in ancillary activities (including processing). - Looking at related employment only, per fish farmer, 2.57 people are active in ancillary activities.(41) **Shetland Islands:** - Per fisherman, 0.33 people work in the ancillary sector (only upstream activities have been included).(3) **Sound of Mull, Scotland:** - Per fish farmer, 2.1 people are active in ancillary activities.(37) **Western Isles:** - Per fisherman, 0.15 people are active in the ancillary industry. - Per fish farmer, 0.57 people are active in ancillary activities and processing.(42)	- Per fish farmer, 3.04 people are active in ancillary activities (including processing). - Looking at related employment only, per fish farmer, 2.57 people are active in ancillary activities. **Shetland Islands:** - Ancillary employment includes processing as a downstream activity. Sound of Mull, Scotland: - Ancillary employment among other things includes logistics and maintenance (not further specified). **Western Isles:** - Ancillary employment includes product marketing, gear manufacture and vessel maintenance and repair.

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Figure 87. Results desk research – Multipliers

While clearly different definitions and methods have been used to determine the level of employment and the multiplier, the majority of employment multipliers are between 0.50 and 1.00. In other words, when one extra fisherman or fish farmer employment created, most likely between 0.50 and 1.00 employment will be created in other sectors related to marine fishing and/or aquaculture. The multipliers above 1 are for a large deal explained by the fact that processing is included as a (downstream) activity or that induced effects also have been taken into account.

Looking at the output multipliers, less have been found. Those that have been found, are almost always below 0.50. Meaning, when 1 Euro income is generated in the primary sector, most likely less than 0.50 Euro is generated in other sectors. Unfortunately, the overall number of multipliers and data found on

income in ancillary services is too low to provide evidence on the expected size of the output multiplier in the European Union.

In comparing sectors, methods, countries and regions, the following was also found:

- There does not seem to be evidence on a different multiplier in marine fishing compared to aquaculture.
- Multipliers do not seem to differ significantly between methods used to calculate the multiplier (I-O analysis vs. surveys, case studies, interviews, and community consultations).
- Different countries do not seem to have significantly different multipliers.
- Different regions does seem to affect the size of the multiplier, since relatively large differences between regions have been found[147].

Overall, only regions seem to influence the size of the multiplier looking at the studies found during the desk research. Unfortunately, most studies merely present the multipliers and do not explain the differences they have found.

In the end, bear in mind that the data presented should be handled with caution, since rarely the same definition of ancillary services is used, indirect and induced effects are taken into account interchangeably, and studies are not transparent on the unit of measure (FTE or overall employment).

III.5 Conclusions of desk research and usability of findings

Looking at the multipliers in marine fishing and aquaculture, the following was found as conclusion of the desk research of this study:

- Employment multipliers tend to lie between 0 and 1, where the majority of employment multipliers lie between 0.50 and 1.00. In other words, 1 extra fisherman or fish farmer most likely creates 0.50 to 1.00 additional employees in activities ancillary to fishing and aquaculture.
- Little output multipliers have been found, but almost all of them are below 0.50. Meaning, 1 Euro generated in the primary sector, most likely generates less than 0.50 Euro in activities ancillary to marine fishing or aquaculture. The number of multipliers found is however limited and it is not possible to give an accurate estimation of the income multiplier.
- No significant evidence has been found for differences between methods (I-O analysis vs. surveys, interviews, and community consultations), countries and sectors (marine fishing vs. aquaculture).
- Differences in the size of the multipliers have been found between regions within and between EU Member States. These differences are most likely explained by the fact that in some regions ancillary activities take place at companies in different regions and that, on the contrary, in some regions ancillary activities are a part of local culture executed by family members of fishermen and fish farmers.

[147] Differences between regions have been found between studies, but also within one study. This substantiates this finding, since these multipliers have been calculated using the same methodology and definitions.

Annex IV Ancillary employment in marine fishing specified

In this an overview of ancillary employment each of the subsectors is provided in further detail.

	Total		Activities related to servicing of equipment and / or vessels		Building and maintaining fishing vessels		Technical equipment		Netting	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**34.747**	**36.379**	**19.649**	**19.342**	12.783	12.901	3.136	3.066	3.730	3.383
Austria	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	**85**	**82**	48	44	31	29	8	7	9	8
Bulgaria	**428**	**120**	242	64	158	43	39	10	46	11
Croatia	**784**	**802**	444	427	289	285	71	68	84	75
Cyprus	**237**	**222**	134	118	87	79	21	19	25	21
Czech Republic	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	**515**	**556**	291	296	190	197	47	47	55	52
Estonia	**158**	**177**	89	94	58	63	14	15	17	17
Finland	**67**	**116**	38	62	25	41	6	10	7	11
France	**2.545**	**2.358**	1.439	1.254	936	836	230	199	273	219
Germany	**353**	**437**	199	232	130	155	32	37	38	41
Greece	**5.950**	**7.960**	3.365	4.232	2.189	2.823	537	671	639	740
Hungary	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	**865**	**944**	489	502	318	335	78	80	93	88
Italy	**6.395**	**6.538**	3.617	3.476	2.353	2.319	577	551	686	608
Latvia	**160**	**144**	91	76	59	51	14	12	17	13
Lithuania	**136**	**102**	77	54	50	36	12	9	15	10
Luxemburg	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**45**	**64**	25	34	16	23	4	5	5	6
Netherlands	**480**	**611**	271	325	177	217	43	51	52	57
Poland	**430**	**509**	243	271	158	180	39	43	46	47
Portugal	**2.470**	**2.374**	1.397	1.262	909	842	223	200	265	221
Romania	**10**	**13**	5	7	4	5	1	1	1	1
Slovakia	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	**24**	**27**	13	15	9	10	2	2	3	3
Spain	**9.667**	**9.318**	5.466	4.954	3.556	3.304	873	785	1.038	866
Sweden	**290**	**293**	164	156	107	104	26	25	31	27
United Kingdom	**2.652**	**2.609**	1.500	1.387	976	925	239	220	285	243

Figure 88. Ancillary employment in activities related to servicing of equipment and / or vessels

	Total		Supplies for the operation		Fuel		Ice and salt		Port facilities	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**34.747**	**36.379**	**5.974**	**5.925**	3.304	2.988	1.121	1.327	1.549	1.610
Austria	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	**85**	**82**	**15**	**13**	8	7	3	3	4	4
Bulgaria	**428**	**120**	**74**	**20**	41	10	14	4	19	5
Croatia	**784**	**802**	**135**	**131**	75	66	25	29	35	36
Cyprus	**237**	**222**	**41**	**36**	23	18	8	8	11	10
Czech Republic	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	**515**	**556**	**89**	**91**	49	46	17	20	23	25
Estonia	**158**	**177**	**27**	**29**	15	15	5	6	7	8
Finland	**67**	**116**	**12**	**19**	6	10	2	4	3	5
France	**2.545**	**2.358**	**438**	**384**	242	194	82	86	113	104
Germany	**353**	**437**	**61**	**71**	34	36	11	16	16	19
Greece	**5.950**	**7.960**	**1.023**	**1.296**	566	654	192	290	265	352
Hungary	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	**865**	**944**	**149**	**154**	82	78	28	34	39	42
Italy	**6.395**	**6.538**	**1.100**	**1.065**	608	537	206	238	285	289
Latvia	**160**	**144**	**28**	**23**	15	12	5	5	7	6
Lithuania	**136**	**102**	**23**	**17**	13	8	4	4	6	5
Luxemburg	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**45**	**64**	**8**	**10**	4	5	1	2	2	3
Netherlands	**480**	**611**	**83**	**99**	46	50	15	22	21	27
Poland	**430**	**509**	**74**	**83**	41	42	14	19	19	23
Portugal	**2.470**	**2.374**	**425**	**387**	235	195	80	87	110	105
Romania	**10**	**13**	**2**	**2**	1	1	N/A	N/A	N/A	1
Slovakia	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	**24**	**27**	**4**	**4**	2	2	1	1	1	1
Spain	**9.667**	**9.318**	**1.662**	**1.518**	919	765	312	340	431	412
Sweden	**290**	**293**	**50**	**48**	28	24	9	11	13	13
United Kingdom	**2.652**	**2.609**	**456**	**425**	252	214	86	95	118	116

Figure 89. Ancillary employment in supplies for the operation

	Total		R + D + I Services		Education and training		Accounting		Management		Insurance		Certification	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**34.747**	**36.379**	**2.295**	**2.203**	862	856	450	314	550	586	380	403	52	44
Austria	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	**85**	**82**	**6**	**5**	2	2	1	1	1	1	1	1	N/A	N/A
Bulgaria	**428**	**120**	**28**	**7**	11	3	6	1	7	2	5	1	1	N/A
Croatia	**784**	**802**	**52**	**49**	19	19	10	7	12	13	9	9	1	1
Cyprus	**237**	**222**	**16**	**13**	6	5	3	2	4	4	3	2	N/A	N/A
Czech Republic	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	**515**	**556**	**34**	**34**	13	13	7	5	8	9	6	6	1	1
Estonia	**158**	**177**	**10**	**11**	4	4	2	2	2	3	2	2	N/A	N/A
Finland	**67**	**116**	**4**	**7**	2	3	1	1	1	2	1	1	N/A	N/A
France	**2.545**	**2.358**	**168**	**143**	63	55	33	20	40	38	28	26	4	3
Germany	**353**	**437**	**23**	**26**	9	10	5	4	6	7	4	5	1	1
Greece	**5.950**	**7.960**	**393**	**482**	148	187	77	69	94	128	65	88	9	10
Hungary	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	**865**	**944**	**57**	**57**	21	22	11	8	14	15	9	10	1	1
Italy	**6.395**	**6.538**	**422**	**396**	159	154	83	56	101	105	70	72	10	8
Latvia	**160**	**144**	**11**	**9**	4	3	2	1	3	2	2	2	N/A	N/A
Lithuania	**136**	**102**	**9**	**6**	3	2	2	1	2	2	1	1	N/A	N/A
Luxemburg	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**45**	**64**	**3**	**4**	1	2	1	1	1	1	N/A	1	N/A	N/A
Netherlands	**480**	**611**	**32**	**37**	12	14	6	5	8	10	5	7	1	1
Poland	**430**	**509**	**28**	**31**	11	12	6	4	7	8	5	6	1	1
Portugal	**2.470**	**2.374**	**163**	**144**	61	56	32	20	39	38	27	26	4	3
Romania	**10**	**13**	**1**	**1**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovakia	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	**24**	**27**	**2**	**2**	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	**9.667**	**9.318**	**638**	**564**	240	219	125	80	153	150	106	103	15	11
Sweden	**290**	**293**	**19**	**18**	7	7	4	3	5	5	3	3	N/A	N/A
United Kingdom	**2.652**	**2.609**	**175**	**158**	66	61	34	23	42	42	29	29	4	3

Figure 90. Ancillary employment in R+D+I services

	Total		Activities related to the sale of fish		Sorting		Transport		Auctioneering		Fish trade		Storage		Pre-sale processing		Packaging	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**34.747**	**36.379**	**6.829**	**8.909**	866	685	825	1.220	346	516	1.571	1.675	145	1.199	2.095	2.332	981	1.282
Austria	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Belgium	**85**	**82**	**17**	**20**	2	2	2	3	1	1	4	4	N/A	3	5	5	2	3
Bulgaria	**428**	**120**	**84**	**29**	11	2	10	4	4	2	19	6	2	4	26	8	12	4
Croatia	**784**	**802**	**154**	**197**	20	15	19	27	8	11	35	37	3	26	47	51	22	28
Cyprus	**237**	**222**	**47**	**54**	6	4	6	7	2	3	11	10	1	7	14	14	7	8
Czech Republic	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Denmark	**515**	**556**	**101**	**136**	13	10	12	19	5	8	23	26	2	18	31	36	15	20
Estonia	**158**	**177**	**31**	**43**	4	3	4	6	2	3	7	8	1	6	10	11	4	6
Finland	**67**	**116**	**13**	**28**	2	2	2	4	1	2	3	5	N/A	4	4	7	2	4
France	**2.545**	**2.358**	**500**	**577**	63	44	60	79	25	33	115	109	11	78	153	151	72	83
Germany	**353**	**437**	**69**	**107**	9	8	8	15	4	6	16	20	1	14	21	28	10	15
Greece	**5.950**	**7.960**	**1.169**	**1.949**	148	150	141	267	59	113	269	366	25	262	359	510	168	281
Hungary	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ireland	**865**	**944**	**170**	**231**	22	18	21	32	9	13	39	43	4	31	52	61	24	33
Italy	**6.395**	**6.538**	**1.257**	**1.601**	159	123	152	219	64	93	289	301	27	215	386	419	180	230
Latvia	**160**	**144**	**32**	**35**	4	3	4	5	2	2	7	7	1	5	10	9	5	5
Lithuania	**136**	**102**	**27**	**25**	3	2	3	3	1	1	6	5	1	3	8	7	4	4
Luxemburg	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**45**	**64**	**9**	**16**	1	1	1	2	N/A	1	2	3	0	2	3	4	1	2
Netherlands	**480**	**611**	**94**	**150**	12	12	11	20	5	9	22	28	2	20	29	39	14	22
Poland	**430**	**509**	**85**	**125**	11	10	10	17	4	7	19	23	2	17	26	33	12	18
Portugal	**2.470**	**2.374**	**485**	**581**	62	45	59	80	25	34	112	109	10	78	149	152	70	84
Romania	**10**	**13**	**2**	**3**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A	N/A	1	1	N/A	N/A
Slovakia	**N/A**	**N/A**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Slovenia	**24**	**27**	**5**	**7**	1	1	1	1	N/A	N/A	1	1	N/A	1	1	2	1	1
Spain	**9.667**	**9.318**	**1.900**	**2.282**	241	176	230	313	96	132	437	429	40	307	583	597	273	328
Sweden	**290**	**293**	**57**	**72**	7	6	7	10	3	4	13	13	1	10	18	19	8	10
United Kingdom	**2.652**	**2.609**	**521**	**639**	66	49	63	88	26	37	120	120	11	86	160	167	75	92

Figure 91. Ancillary employment in activities related to the sale of fish

Annex V Ancillary employment and income in aquaculture specified[148]

V.1 Ancillary employment per segment

In this paragraph ancillary employment is further specified per segment identified in aquaculture, e.g. marine finfish aquaculture, other freshwater aquaculture, trout freshwater aquaculture, and bivalve aquaculture. Data is presented in tables as well as geographical maps.

V1.1 Tables

V.1.1.1 Marine finfish aquaculture

	Employment (in FTE)	
	2009	2014
EU	**4.325 (2.870 - 5.781)**	**5.074 (3.513 - 6.634)**
Austria	N/A (-)	N/A (-)
Belgium	N/A (-)	N/A (-)
Bulgaria	N/A (-)	N/A (-)
Croatia	93 (62 - 125)	87 (61 - 114)
Cyprus	44 (29 - 59)	75 (52 - 98)
Czech Republic	N/A (-)	N/A (-)
Denmark	133 (88 - 178)	144 (100 - 188)
Estonia	N/A (-)	N/A (-)
Finland	N/A (-)	N/A (-)
France	76 (51 - 102)	84 (58 - 109)
Germany	N/A (-)	N/A (-)
Greece	1.256 (834 - 1.679)	1.706 (1.181 - 2.231)
Hungary	N/A	N/A

[148] PLease note that figures presented in this annex may differ due to rounding differences.

	Employment (in FTE)	
	2009	2014
	(-)	(-)
Ireland	167 (111 - 223)	110 (76 - 144)
Italy	100 (66 - 134)	80 (55 - 105)
Latvia	N/A (-)	N/A (-)
Lithuania	N/A (-)	N/A (-)
Luxemburg	N/A (-)	N/A (-)
Malta	38 (25 - 50)	55 (38 - 72)
Netherlands	N/A (-)	N/A (-)
Poland	N/A (-)	N/A (-)
Portugal	25 (17 - 34)	56 (39 - 73)
Romania	N/A (-)	N/A (-)
Slovakia	N/A (-)	N/A (-)
Slovenia	1 (1 - 1)	1 (1 - 1)
Spain	571 (379 - 763)	529 (366 - 692)
Sweden	32 (21 - 43)	43 (30 - 56)
United Kingdom	1.790 (1.188 - 2.392)	2.103 (1.456 - 2.750)

Figure 92. Employment in activities ancillary to marine finfish aquaculture (source: Case studies)

V.1.1.2 Other freshwater aquaculture

	Employment (in FTE)	
	2009	2014
EU	**8.296**	**13.151**
	(-)	**(6.981 - 19.322)**
Austria	13	51
	(-)	(27 - 75)
Belgium	10	N/A
	(-)	(-)
Bulgaria	94	346
	(-)	(184 - 509)
Croatia	25	51
	(-)	(27 - 74)
Cyprus	N/A	N/A
	(-)	(-)
Czech Republic	824	1.332
	(-)	(707 - 1.957)
Denmark	733	1.198
	(-)	(636 - 1.759)
Estonia	612	411
	(-)	(218 - 604)
Finland	3	3
	(-)	(2 - 5)
France	467	669
	(-)	(355 - 983)
Germany	532	773
	(-)	(411 - 1.136)
Greece	31	53
	(-)	(28 - 77)
Hungary	389	796
	(-)	(423 - 1.170)
Ireland	21	27
	(-)	(14 - 40)
Italy	1.113	1.836
	(-)	(974 - 2.697)
Latvia	1.088	1.650
	(-)	(876 - 2.424)
Lithuania	8	26
	(-)	(14 - 39)
Luxemburg	N/A	N/A

	Employment (in FTE)	
	2009	2014
	(-)	(-)
Malta	47	167
	(-)	(89 - 245)
Netherlands	13	32
	(-)	(17 - 47)
Poland	986	1.150
	(-)	(610 - 1.690)
Portugal	1	9
	(-)	(5 - 13)
Romania	101	208
	(-)	(110 - 305)
Slovakia	214	347
	(-)	(184 - 510)
Slovenia	21	32
	(-)	(17 - 47)
Spain	51	104
	(-)	(55 - 152)
Sweden	99	219
	(-)	(116 - 322)
United Kingdom	800	1.661
	(-)	(882 - 2.441)

Figure 93. Employment in activities ancillary to other freshwater aquaculture (source: Case studies)

V.1.1.3 Trout freshwater aquaculture

	Employment (in FTE)	
	2009	2014
EU	**979** **(478 - 1.481)**	**998** **(512 - 1.484)**
Austria	14 (7 - 21)	17 (9 - 26)
Belgium	N/A (-)	2 (1 - 2)
Bulgaria	22 (11 - 33)	26 (13 - 38)
Croatia	N/A (-)	N/A (-)
Cyprus	N/A (-)	N/A (-)
Czech Republic	6 (3 - 9)	5 (2 - 7)
Denmark	25 (12 - 38)	17 (9 - 25)
Estonia	N/A (-)	1 (1 - 1)
Finland	25 (12 - 38)	29 (15 - 43)
France	5 (3 - 8)	5 (2 - 7)
Germany	205 (100 - 310)	242 (124 - 360)
Greece	1 (1 - 2)	7 (4 - 11)
Hungary	N/A (-)	N/A (-)
Ireland	N/A (-)	N/A (-)
Italy	1 (1 - 1)	0 (-)
Latvia	466 (227 - 704)	454 (233 - 675)
Lithuania	190 (93 - 287)	167 (86 - 249)
Luxemburg	N/A	N/A

	Employment (in FTE)	
	2009	2014
	(-)	(-)
Malta	N/A	N/A
	(-)	(-)
Netherlands	N/A	N/A
	(-)	(-)
Poland	4	0
	(2 - 6)	(-)
Portugal	5	2
	(2 - 7)	(1 - 4)
Romania	N/A	N/A
	(-)	(-)
Slovakia	N/A	N/A
	(-)	(-)
Slovenia	7	21
	(3 - 11)	(11 - 31)
Spain	N/A	N/A
	(-)	(-)
Sweden	3	3
	(2 - 5)	(2 - 5)
United Kingdom	N/A	N/A
	(-)	(-)

Figure 94. Employment in activities ancillary to trout freshwater aquaculture (source: Case studies)

V.1.1.4 Bivalve aquaculture

	Employment (in FTE)	
	2009	2014
EU	**5.527** **(1.479 - 9.574)**	**5.414** **(3.062 - 7.767)**
Austria	N/A (-)	N/A (-)
Belgium	N/A (-)	N/A (-)
Bulgaria	7 (2 - 12)	21 (12 - 30)
Croatia	18 (5 - 30)	19 (11 - 28)
Cyprus	N/A (-)	N/A (-)
Czech Republic	N/A (-)	N/A (-)
Denmark	22 (6 - 38)	1 (1 - 1)
Estonia	N/A (-)	N/A (-)
Finland	N/A (-)	N/A (-)
France	1.585 (424 - 2.746)	1.461 (827 - 2.096)
Germany	31 (8 - 54)	53 (30 - 77)
Greece	191 (51 - 330)	159 (90 - 228)
Hungary	N/A (-)	N/A (-)
Ireland	288 (77 - 500)	211 (119 - 302)
Italy	934 (250 - 1.618)	1.083 (613 - 1.554)
Latvia	N/A (-)	N/A (-)
Lithuania	N/A (-)	N/A (-)
Luxemburg	N/A	N/A

	Employment (in FTE)	
	2009	2014
	(-)	(-)
Malta	N/A (-)	N/A (-)
Netherlands	406 (109 - 703)	577 (326 - 827)
Poland	N/A (-)	N/A (-)
Portugal	28 (8 - 49)	38 (21 - 54)
Romania	N/A (-)	N/A (-)
Slovakia	N/A (-)	N/A (-)
Slovenia	3 (1 - 5)	3 (2 - 5)
Spain	1.723 (461 - 2.984)	1.520 (860 - 2.180)
Sweden	18 (5 - 31)	16 (9 - 22)
United Kingdom	273 (73 - 473)	253 (143 - 363)

Figure 95. Employment in activities ancillary to bivalve aquaculture (source: Case studies)

V.1.2 Geographical maps

V.1.2.1 Marine finfish aquaculture

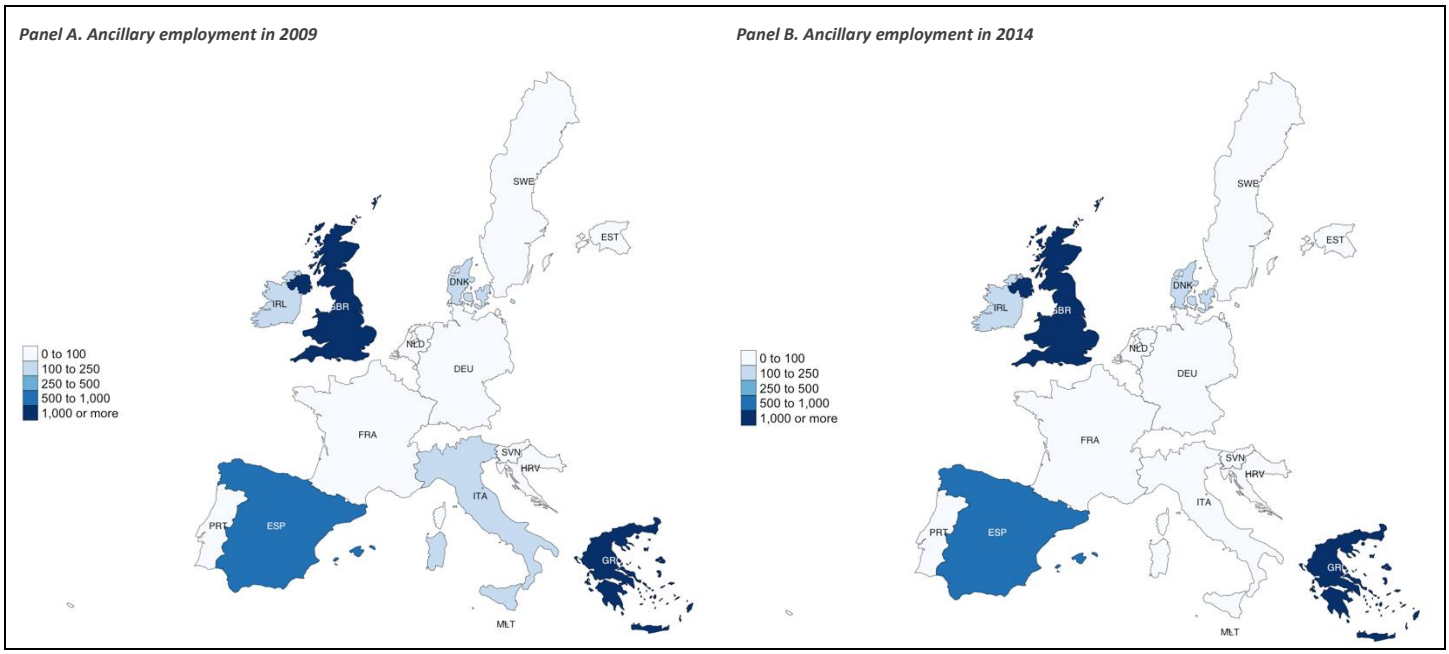

Figure 96. Employment in the sector ancillary to marine finfish aquaculture

V.1.2.2 Other freshwater aquaculture

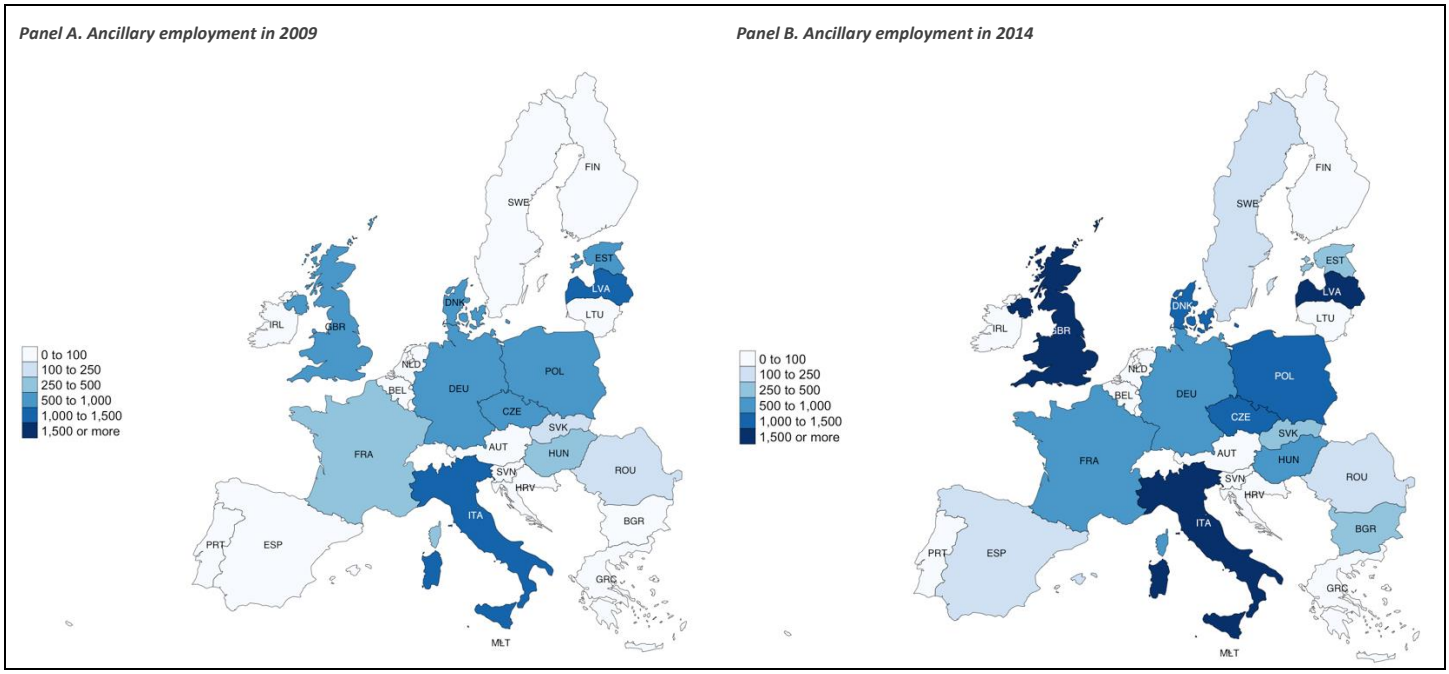

Figure 97. Employment in the sector ancillary to other freshwater aquaculture

V.1.2.3 Trout freshwater aquaculture

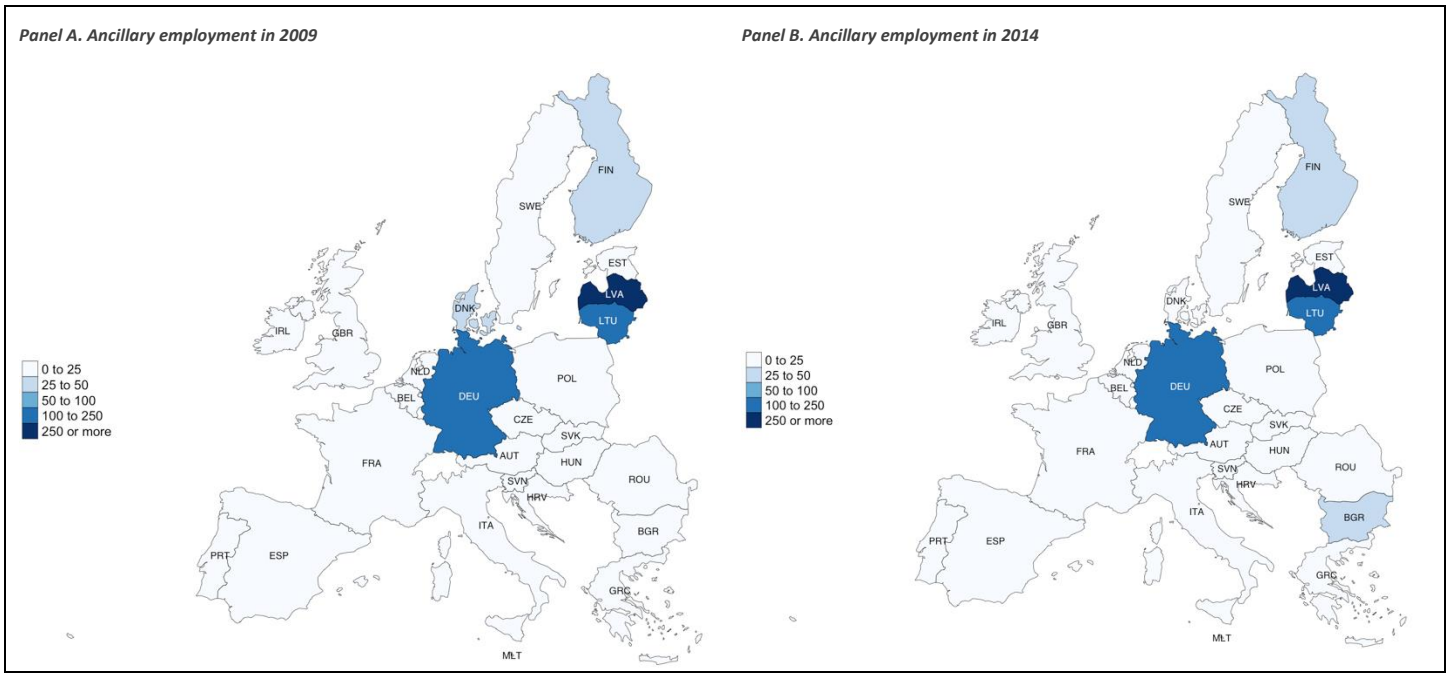

Figure 98. Employment in the sector ancillary to trout freshwater aquaculture

V.1.2.4 Bivalve aquaculture

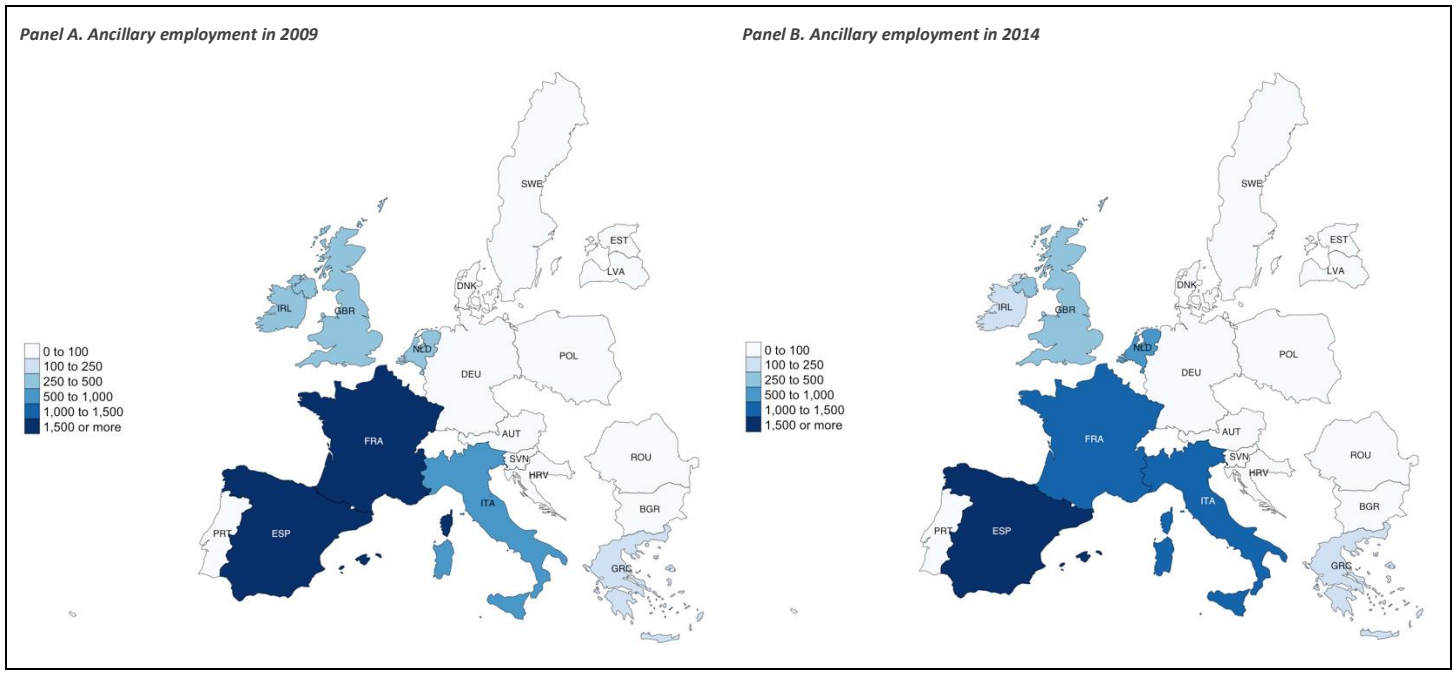

Figure 99. Employment in the sector ancillary to bivalve aquaculture

V.2 Ancillary employment per segment per subsector

In this paragraph ancillary employment is explained per segment and per subsector, in both geographical maps as well as tables.

V.2.1 Tables

V.2.1.1 Aquaculture

	Total		Activities related to servicing of equipment and / or vessels		Building and maintaining aquaculture installations		Technical equipment	
	2009	2014	2009	2014	2009	2014	2009	2014
EU	**19.127**	**24.638**	**4.800**	**8.342**	1.522	4.023	3.279	4.318
Austria	**27**	**68**	**7**	**23**	2	11	5	12
Belgium	**10**	**2**	**3**	**1**	1	N/A	2	N/A
Bulgaria	**123**	**393**	**31**	**133**	10	64	21	69
Croatia	**136**	**157**	**34**	**53**	11	26	23	28
Cyprus	**44**	**75**	**11**	**25**	3	12	8	13
Czech Republic	**830**	**1.337**	**208**	**453**	66	218	142	234
Denmark	**912**	**1.359**	**229**	**460**	73	222	156	238
Estonia	**612**	**412**	**154**	**139**	49	67	105	72
Finland	**28**	**32**	**7**	**11**	2	5	5	6
France	**2.134**	**2.219**	**536**	**751**	170	362	366	389
Germany	**768**	**1.069**	**193**	**362**	61	175	132	187
Greece	**1.479**	**1.925**	**371**	**652**	118	314	254	337
Hungary	**389**	**796**	**98**	**270**	31	130	67	140
Ireland	**476**	**348**	**119**	**118**	38	57	82	61
Italy	**2.148**	**2.999**	**539**	**1.015**	171	490	368	526
Latvia	**1.554**	**2.104**	**390**	**712**	124	344	266	369
Lithuania	**198**	**194**	**50**	**66**	16	32	34	34
Luxemburg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**84**	**222**	**21**	**75**	7	36	14	39
Netherlands	**418**	**609**	**105**	**206**	33	99	72	107
Poland	**990**	**1.150**	**248**	**389**	79	188	170	202
Portugal	**60**	**104**	**15**	**35**	5	17	10	18
Romania	**101**	**208**	**25**	**70**	8	34	17	36
Slovakia	**215**	**347**	**54**	**118**	17	57	37	61
Slovenia	**31**	**57**	**8**	**19**	3	9	5	10
Spain	**2.344**	**2.153**	**588**	**729**	187	352	402	377
Sweden	**152**	**281**	**38**	**95**	12	46	26	49
United Kingdom	**2.863**	**4.018**	**719**	**1.360**	228	656	491	704

Figure 100. Employment in activities related to servicing of equipment and/or vessels, specified

	Total		Supplies for the operation		Feed		Energy (electricity, water and fuel)		Veterinary services		Fertilisers		Sewage processing	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**19.127**	**24.638**	**7.659**	**7.622**	6.021	6.689	248	284	408	413	N/A	236	982	N/A
Austria	**27**	**68**	**11**	**21**	9	19	N/A	1	1	1	N/A	1	1	N/A
Belgium	**10**	**2**	**4**	**1**	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1	N/A
Bulgaria	**123**	**393**	**49**	**122**	39	107	2	5	3	7	N/A	4	6	N/A
Croatia	**136**	**157**	**54**	**49**	43	43	2	2	3	3	N/A	2	7	N/A
Cyprus	**44**	**75**	**18**	**23**	14	20	1	1	1	1	N/A	1	2	N/A
Czech Republic	**830**	**1.337**	**332**	**414**	261	363	11	15	18	22	N/A	13	43	N/A
Denmark	**912**	**1.359**	**365**	**420**	287	369	12	16	19	23	N/A	13	47	N/A
Estonia	**612**	**412**	**245**	**127**	193	112	8	5	13	7	N/A	4	31	N/A
Finland	**28**	**32**	**11**	**10**	9	9	N/A	N/A	1	1	N/A	N/A	1	N/A
France	**2.134**	**2.219**	**855**	**686**	672	602	28	26	46	37	N/A	21	110	N/A
Germany	**768**	**1.069**	**308**	**331**	242	290	10	12	16	18	N/A	10	39	N/A
Greece	**1.479**	**1.925**	**592**	**595**	466	523	19	22	32	32	N/A	18	76	N/A
Hungary	**389**	**796**	**156**	**246**	123	216	5	9	8	13	N/A	8	20	N/A
Ireland	**476**	**348**	**190**	**108**	150	94	6	4	10	6	N/A	3	24	N/A
Italy	**2.148**	**2.999**	**860**	**928**	676	814	28	35	46	50	N/A	29	110	N/A
Latvia	**1.554**	**2.104**	**622**	**651**	489	571	20	24	33	35	N/A	20	80	N/A
Lithuania	**198**	**194**	**79**	**60**	62	53	3	2	4	3	N/A	2	10	N/A
Luxemburg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**84**	**222**	**34**	**69**	27	60	1	3	2	4	N/A	2	4	N/A
Netherlands	**418**	**609**	**167**	**188**	132	165	5	7	9	10	N/A	6	21	N/A
Poland	**990**	**1.150**	**396**	**356**	311	312	13	13	21	19	N/A	11	51	N/A
Portugal	**60**	**104**	**24**	**32**	19	28	1	1	1	2	N/A	1	3	N/A
Romania	**101**	**208**	**40**	**64**	32	56	1	2	2	3	N/A	2	5	N/A
Slovakia	**215**	**347**	**86**	**107**	68	94	3	4	5	6	N/A	3	11	N/A
Slovenia	**31**	**57**	**13**	**18**	10	16	N/A	1	1	1	N/A	1	2	N/A
Spain	**2.344**	**2.153**	**939**	**666**	738	585	30	25	50	36	N/A	21	120	N/A
Sweden	**152**	**281**	**61**	**87**	48	76	2	3	3	5	N/A	3	8	N/A
United Kingdom	**2.863**	**4.018**	**1.146**	**1.243**	901	1.091	37	46	61	67	N/A	39	147	N/A

Figure 101. Employment in activities related to supplies for the operation, specified

	Total		R + D + I Services		Education and training		Research		Accounting		Management		Insurance		Certification	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**19.127**	**24.638**	**740**	**1.254**	302	484	333	369	15	15	N/A	304	66	66	15	15
Austria	**27**	**68**	**1**	**3**	N/A	1	N/A	1	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A
Belgium	**10**	**2**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bulgaria	**123**	**393**	**5**	**20**	2	8	2	6	N/A	N/A	N/A	5	N/A	1	N/A	N/A
Croatia	**136**	**157**	**5**	**8**	2	3	2	2	N/A	N/A	N/A	2	N/A	N/A	N/A	N/A
Cyprus	**44**	**75**	**2**	**4**	1	1	1	1	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A
Czech Republic	**830**	**1.337**	**32**	**68**	13	26	14	20	1	1	N/A	17	3	4	1	1
Denmark	**912**	**1.359**	**35**	**69**	14	27	16	20	1	1	N/A	17	3	4	1	1
Estonia	**612**	**412**	**24**	**21**	10	8	11	6	N/A	N/A	N/A	5	2	1	N/A	0
Finland	**28**	**32**	**1**	**2**	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
France	**2.134**	**2.219**	**83**	**113**	34	44	37	33	2	1	N/A	27	7	6	2	1
Germany	**768**	**1.069**	**30**	**54**	12	21	13	16	1	1	N/A	13	3	3	1	1
Greece	**1.479**	**1.925**	**57**	**98**	23	38	26	29	1	1	N/A	24	5	5	1	1
Hungary	**389**	**796**	**15**	**41**	6	16	7	12	N/A	N/A	N/A	10	1	2	N/A	N/A
Ireland	**476**	**348**	**18**	**18**	8	7	8	5	N/A	N/A	N/A	4	2	1	N/A	N/A
Italy	**2.148**	**2.999**	**83**	**153**	34	59	37	45	2	2	N/A	37	7	8	2	2
Latvia	**1.554**	**2.104**	**60**	**107**	25	41	27	32	1	1	N/A	26	5	6	1	1
Lithuania	**198**	**194**	**8**	**10**	3	4	3	3	N/A	N/A	N/A	2	1	1	N/A	N/A
Luxemburg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A
Malta	**84**	**222**	**3**	**11**	1	4	1	3	N/A	N/A	N/A	3	0	1	N/A	N/A
Netherlands	**418**	**609**	**16**	**31**	7	12	7	9	N/A	N/A	N/A	8	1	2	N/A	N/A
Poland	**990**	**1.150**	**38**	**59**	16	23	17	17	1	1	N/A	14	3	3	1	1
Portugal	**60**	**104**	**2**	**5**	1	2	1	2	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A
Romania	**101**	**208**	**4**	**11**	2	4	2	3	N/A	N/A	N/A	3	N/A	1	N/A	N/A
Slovakia	**215**	**347**	**8**	**18**	3	7	4	5	N/A	N/A	N/A	4	1	1	N/A	N/A
Slovenia	**31**	**57**	**1**	**3**	N/A	1	1	1	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A
Spain	**2.344**	**2.153**	**91**	**110**	37	42	41	32	2	1	N/A	27	8	6	2	1
Sweden	**152**	**281**	**6**	**14**	2	6	3	4	N/A	N/A	N/A	3	1	1	N/A	N/A
United Kingdom	**2.863**	**4.018**	**111**	**204**	45	79	50	60	2	2	N/A	50	10	11	2	2

Figure 102. Employment in activities related to R+D+I services, specified

	Total		Activities related to the sale of fish		Pre-sale processing (slaughtering, processing, depuration)		Handling and packaging		Transport		Fish trade	
	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014	2009	2014
EU	**19.127**	**24.638**	**5.928**	**7.420**	90	75	2.440	2.499	766	1.964	2.632	2.881
Austria	**27**	**68**	**8**	**21**	N/A	N/A	3	7	1	5	4	8
Belgium	**10**	**2**	**3**	N/A	N/A	N/A	1	N/A	N/A	N/A	1	N/A
Bulgaria	**123**	**393**	**38**	**118**	1	1	16	40	5	31	17	46
Croatia	**136**	**157**	**42**	**47**	1	N/A	17	16	5	13	19	18
Cyprus	**44**	**75**	**14**	**23**	N/A	N/A	6	8	2	6	6	9
Czech Republic	**830**	**1.337**	**257**	**403**	4	4	106	136	33	107	114	156
Denmark	**912**	**1.359**	**283**	**409**	4	4	116	138	37	108	126	159
Estonia	**612**	**412**	**190**	**124**	3	1	78	42	25	33	84	48
Finland	**28**	**32**	**9**	**10**	N/A	N/A	4	3	1	3	4	4
France	**2.134**	**2.219**	**661**	**668**	10	7	272	225	85	177	294	260
Germany	**768**	**1.069**	**238**	**322**	4	3	98	108	31	85	106	125
Greece	**1.479**	**1.925**	**458**	**580**	7	6	189	195	59	153	204	225
Hungary	**389**	**796**	**121**	**240**	2	2	50	81	16	63	54	93
Ireland	**476**	**348**	**147**	**105**	2	1	61	35	19	28	65	41
Italy	**2.148**	**2.999**	**666**	**903**	10	9	274	304	86	239	296	351
Latvia	**1.554**	**2.104**	**482**	**634**	7	6	198	213	62	168	214	246
Lithuania	**198**	**194**	**61**	**58**	1	1	25	20	8	15	27	23
Luxemburg	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Malta	**84**	**222**	**26**	**67**	N/A	1	11	22	3	18	12	26
Netherlands	**418**	**609**	**130**	**183**	2	2	53	62	17	49	58	71
Poland	**990**	**1.150**	**307**	**346**	5	4	126	117	40	92	136	135
Portugal	**60**	**104**	**18**	**31**	N/A	N/A	8	11	2	8	8	12
Romania	**101**	**208**	**31**	**63**	N/A	1	13	21	4	17	14	24
Slovakia	**215**	**347**	**67**	**105**	1	1	27	35	9	28	30	41
Slovenia	**31**	**57**	**10**	**17**	N/A	N/A	4	6	1	5	4	7
Spain	**2.344**	**2.153**	**727**	**649**	11	7	299	218	94	172	323	252
Sweden	**152**	**281**	**47**	**85**	1	1	19	28	6	22	21	33
United Kingdom	**2.863**	**4.018**	**887**	**1.210**	13	12	365	408	115	320	394	470

Figure 103. Employment in pre-sale activities, specified

V.2.1.2 Marine finfish aquaculture

2009	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**4.325**	**1.086**	**1.732**	**167**	**1.341**
Austria	N/A	N/A	N/A	N/A	N/A
Belgium	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A
Croatia	**93**	**23**	**37**	**4**	**29**
Cyprus	**44**	**11**	**18**	**2**	**14**
Czech Republic	N/A	N/A	N/A	N/A	N/A
Denmark	**133**	**33**	**53**	**5**	**41**
Estonia	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A
France	**76**	**19**	**31**	**3**	**24**
Germany	N/A	N/A	N/A	N/A	N/A
Greece	**1.256**	**315**	**503**	**49**	**389**
Hungary	N/A	N/A	N/A	N/A	N/A
Ireland	**167**	**42**	**67**	**6**	**52**
Italy	**100**	**25**	**40**	**4**	**31**
Latvia	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	**38**	**9**	**15**	**1**	**12**
Netherlands	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A
Portugal	**25**	**6**	**10**	**1**	**8**
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A
Slovenia	**1**	N/A	N/A	N/A	N/A
Spain	**571**	**143**	**228**	**22**	**177**
Sweden	**32**	**8**	**13**	**1**	**10**
United Kingdom	**1.790**	**449**	**717**	**69**	**555**

2014	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**5.074**	**1.718**	**1.570**	**258**	**1.528**
Austria	N/A	N/A	N/A	N/A	N/A
Belgium	N/A	N/A	N/A	N/A	N/A
Bulgaria	N/A	N/A	N/A	N/A	N/A
Croatia	**87**	**30**	**27**	**4**	**26**
Cyprus	**75**	**25**	**23**	**4**	**23**
Czech Republic	N/A	N/A	N/A	N/A	N/A
Denmark	**144**	**49**	**45**	**7**	**43**
Estonia	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A
France	**84**	**28**	**26**	**4**	**25**
Germany	N/A	N/A	N/A	N/A	N/A
Greece	**1.706**	**578**	**528**	**87**	**514**
Hungary	N/A	N/A	N/A	N/A	N/A
Ireland	**110**	**37**	**34**	**6**	**33**
Italy	**80**	**27**	**25**	**4**	**24**
Latvia	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	**55**	**19**	**17**	**3**	**17**
Netherlands	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A
Portugal	**56**	**19**	**17**	**3**	**17**
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A
Slovenia	**1**	N/A	N/A	N/A	N/A
Spain	**529**	**179**	**164**	**27**	**159**
Sweden	**43**	**15**	**13**	**2**	**13**
United Kingdom	**2.103**	**712**	**651**	**107**	**633**

Figure 104. Employment in subsectors in the sector ancillary to marine finfish aquaculture

V.2.1.3 Other freshwater aquaculture

2009	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**8.296**	**2.082**	**3.322**	**321**	**2.571**
Austria	**13**	**3**	**5**	**1**	**4**
Belgium	**10**	**2**	**4**	N/A	**3**
Bulgaria	**94**	**24**	**38**	**4**	**29**
Croatia	**25**	**6**	**10**	**1**	**8**
Cyprus	N/A	N/A	N/A	N/A	N/A
Czech Republic	**824**	**207**	**330**	**32**	**255**
Denmark	**733**	**184**	**293**	**28**	**227**
Estonia	**612**	**154**	**245**	**24**	**190**
Finland	**3**	**1**	**1**	N/A	**1**
France	**467**	**117**	**187**	**18**	**145**
Germany	**532**	**133**	**213**	**21**	**165**
Greece	**31**	**8**	**12**	**1**	**10**
Hungary	**389**	**98**	**156**	**15**	**121**
Ireland	**21**	**5**	**8**	**1**	**6**
Italy	**1.113**	**279**	**446**	**43**	**345**
Latvia	**1.088**	**273**	**436**	**42**	**337**
Lithuania	**8**	**2**	**3**	N/A	**3**
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	**47**	**12**	**19**	**2**	**14**
Netherlands	**13**	**3**	**5**	N/A	**4**
Poland	**986**	**247**	**395**	**38**	**305**
Portugal	**1**	N/A	**1**	N/A	N/A
Romania	**101**	**25**	**40**	**4**	**31**
Slovakia	**214**	**54**	**86**	**8**	**66**
Slovenia	**21**	**5**	**8**	**1**	**6**
Spain	**51**	**13**	**20**	**2**	**16**
Sweden	**99**	**25**	**40**	**4**	**31**
United Kingdom	**800**	**201**	**320**	**31**	**248**

2014	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**13.151**	**4.453**	**4.069**	**669**	**3.961**
Austria	**51**	**17**	**16**	**3**	**15**
Belgium	N/A	N/A	N/A	N/A	N/A
Bulgaria	**346**	**117**	**107**	**18**	**104**
Croatia	**51**	**17**	**16**	**3**	**15**
Cyprus	N/A	N/A	N/A	N/A	N/A
Czech Republic	**1.332**	**451**	**412**	**68**	**401**
Denmark	**1.198**	**405**	**370**	**61**	**361**
Estonia	**411**	**139**	**127**	**21**	**124**
Finland	**3**	**1**	**1**	N/A	**1**
France	**669**	**227**	**207**	**34**	**202**
Germany	**773**	**262**	**239**	**39**	**233**
Greece	**53**	**18**	**16**	**3**	**16**
Hungary	**796**	**270**	**246**	**41**	**240**
Ireland	**27**	**9**	**8**	**1**	**8**
Italy	**1.836**	**621**	**568**	**93**	**553**
Latvia	**1.650**	**559**	**510**	**84**	**497**
Lithuania	**26**	**9**	**8**	**1**	**8**
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	**167**	**56**	**52**	**8**	**50**
Netherlands	**32**	**11**	**10**	**2**	**10**
Poland	**1.150**	**389**	**356**	**59**	**346**
Portugal	**9**	**3**	**3**	N/A	**3**
Romania	**208**	**70**	**64**	**11**	**63**
Slovakia	**347**	**118**	**107**	**18**	**105**
Slovenia	**32**	**11**	**10**	**2**	**10**
Spain	**104**	**35**	**32**	**5**	**31**
Sweden	**219**	**74**	**68**	**11**	**66**
United Kingdom	**1.661**	**563**	**514**	**85**	**500**

Figure 105. Employment in subsectors in the sector ancillary to other freshwater aquaculture

V.2.1.4 Trout freshwater aquaculture

2009	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**979**	**246**	**392**	**38**	**304**
Austria	**14**	**4**	**6**	**1**	**4**
Belgium	N/A	N/A	N/A	N/A	N/A
Bulgaria	**22**	**5**	**9**	**1**	**7**
Croatia	N/A	N/A	N/A	N/A	N/A
Cyprus	N/A	N/A	N/A	N/A	N/A
Czech Republic	**6**	**1**	**2**	N/A	**2**
Denmark	**25**	**6**	**10**	**1**	**8**
Estonia	N/A	N/A	N/A	N/A	N/A
Finland	**25**	**6**	**10**	**1**	**8**
France	**5**	**1**	**2**	N/A	**2**
Germany	**205**	**52**	**82**	**8**	**64**
Greece	**1**	N/A	**1**	N/A	N/A
Hungary	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A
Italy	**1**	N/A	N/A	N/A	N/A
Latvia	**466**	**117**	**186**	**18**	**144**
Lithuania	**190**	**48**	**76**	**7**	**59**
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A
Poland	**4**	**1**	**2**	N/A	**1**
Portugal	**5**	**1**	**2**	N/A	**1**
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A
Slovenia	**7**	**2**	**3**	N/A	**2**
Spain	N/A	N/A	N/A	N/A	N/A
Sweden	**3**	**1**	**1**	N/A	**1**
United Kingdom	N/A	N/A	N/A	N/A	N/A

2014	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**998**	**338**	**309**	**51**	**301**
Austria	**17**	**6**	**5**	**1**	**5**
Belgium	**2**	**1**	**1**	N/A	N/A
Bulgaria	**26**	**9**	**8**	**1**	**8**
Croatia	N/A	N/A	N/A	N/A	N/A
Cyprus	N/A	N/A	N/A	N/A	N/A
Czech Republic	**5**	**2**	**1**	N/A	**1**
Denmark	**17**	**6**	**5**	**1**	**5**
Estonia	**1**	N/A	N/A	N/A	N/A
Finland	**29**	**10**	**9**	**1**	**9**
France	**5**	**2**	**1**	N/A	**1**
Germany	**242**	**82**	**75**	**12**	**73**
Greece	**7**	**2**	**2**	N/A	**2**
Hungary	N/A	N/A	N/A	N/A	N/A
Ireland	N/A	N/A	N/A	N/A	N/A
Italy	N/A	N/A	N/A	N/A	N/A
Latvia	**454**	**154**	**140**	**23**	**137**
Lithuania	**167**	**57**	**52**	**9**	**50**
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	N/A	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A
Poland	N/A	N/A	N/A	N/A	N/A
Portugal	**2**	**1**	**1**	N/A	**1**
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A
Slovenia	**21**	**7**	**7**	**1**	**6**
Spain	N/A	N/A	N/A	N/A	N/A
Sweden	**3**	**1**	**1**	N/A	**1**
United Kingdom	N/A	N/A	N/A	N/A	N/A

Figure 106. Employment in subsectors in the sector ancillary to trout freshwater aquaculture

V.2.1.5 Bivalve aquaculture

2009	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**5.527**	**1.387**	**2.213**	**214**	**1.713**
Austria	N/A	N/A	N/A	N/A	N/A
Belgium	N/A	N/A	N/A	N/A	N/A
Bulgaria	**7**	**2**	**3**	N/A	**2**
Croatia	**18**	**4**	**7**	**1**	**5**
Cyprus	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A
Denmark	**22**	**5**	**9**	**1**	**7**
Estonia	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A
France	**1.585**	**398**	**635**	**61**	**491**
Germany	**31**	**8**	**13**	**1**	**10**
Greece	**191**	**48**	**76**	**7**	**59**
Hungary	N/A	N/A	N/A	N/A	N/A
Ireland	**288**	**72**	**115**	**11**	**89**
Italy	**934**	**234**	**374**	**36**	**289**
Latvia	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	N/A	N/A	N/A	N/A	N/A
Netherlands	**406**	**102**	**162**	**16**	**126**
Poland	N/A	N/A	N/A	N/A	N/A
Portugal	**28**	**7**	**11**	**1**	**9**
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A
Slovenia	**3**	**1**	**1**	N/A	**1**
Spain	**1.723**	**432**	**690**	**67**	**534**
Sweden	**18**	**5**	**7**	**1**	**6**
United Kingdom	**273**	**69**	**109**	**11**	**85**

2014	Total	Activities related to servicing of equipment and / or vessels	Supplies for the operation	R + D + I Services	Activities related to the sale of fish
EU	**5.414**	**1.833**	**1.675**	**276**	**1.631**
Austria	N/A	N/A	N/A	N/A	N/A
Belgium	N/A	N/A	N/A	N/A	N/A
Bulgaria	**21**	**7**	**6**	**1**	**6**
Croatia	**19**	**7**	**6**	**1**	**6**
Cyprus	N/A	N/A	N/A	N/A	N/A
Czech Republic	N/A	N/A	N/A	N/A	N/A
Denmark	**1**	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	N/A	N/A
Finland	N/A	N/A	N/A	N/A	N/A
France	**1.461**	**495**	**452**	**74**	**440**
Germany	**53**	**18**	**17**	**3**	**16**
Greece	**159**	**54**	**49**	**8**	**48**
Hungary	N/A	N/A	N/A	N/A	N/A
Ireland	**211**	**71**	**65**	**11**	**63**
Italy	**1.083**	**367**	**335**	**55**	**326**
Latvia	N/A	N/A	N/A	N/A	N/A
Lithuania	N/A	N/A	N/A	N/A	N/A
Luxemburg	N/A	N/A	N/A	N/A	N/A
Malta	N/A	N/A	N/A	N/A	N/A
Netherlands	**577**	**195**	**178**	**29**	**174**
Poland	N/A	N/A	N/A	N/A	N/A
Portugal	**38**	**13**	**12**	**2**	**11**
Romania	N/A	N/A	N/A	N/A	N/A
Slovakia	N/A	N/A	N/A	N/A	N/A
Slovenia	**3**	**1**	**1**	N/A	**1**
Spain	**1.520**	**515**	**470**	**77**	**458**
Sweden	**16**	**5**	**5**	**1**	**5**
United Kingdom	**253**	**86**	**78**	**13**	**76**

Figure 107. Employment in subsectors in the sector ancillary to marine finfish aquaculture

V.2.2 Geographical maps

V.2.2.1 Marine finfish aquaculture

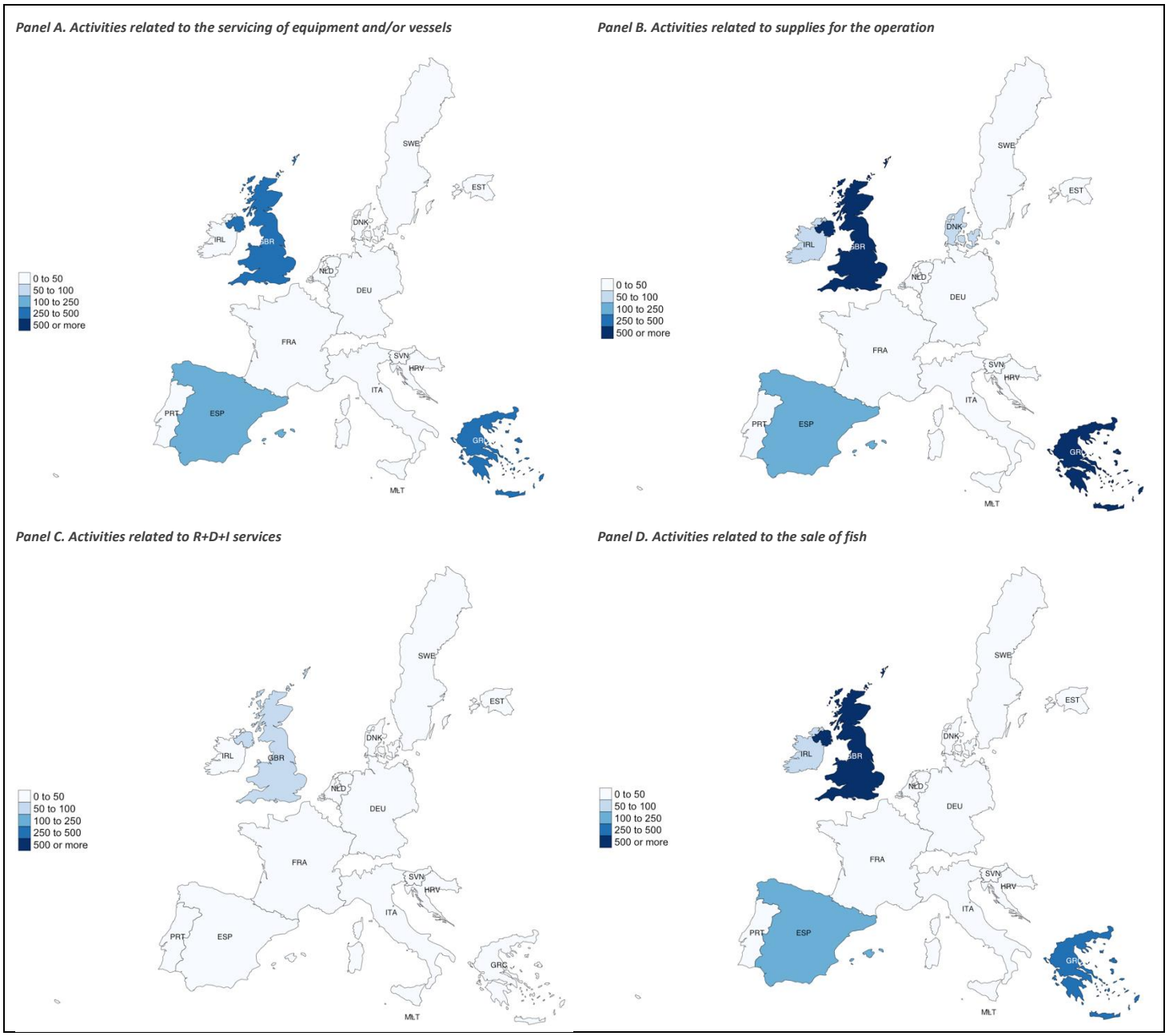

Figure 108. Employment per sub-activity in the sector ancillary to marine finfish aquaculture 2009

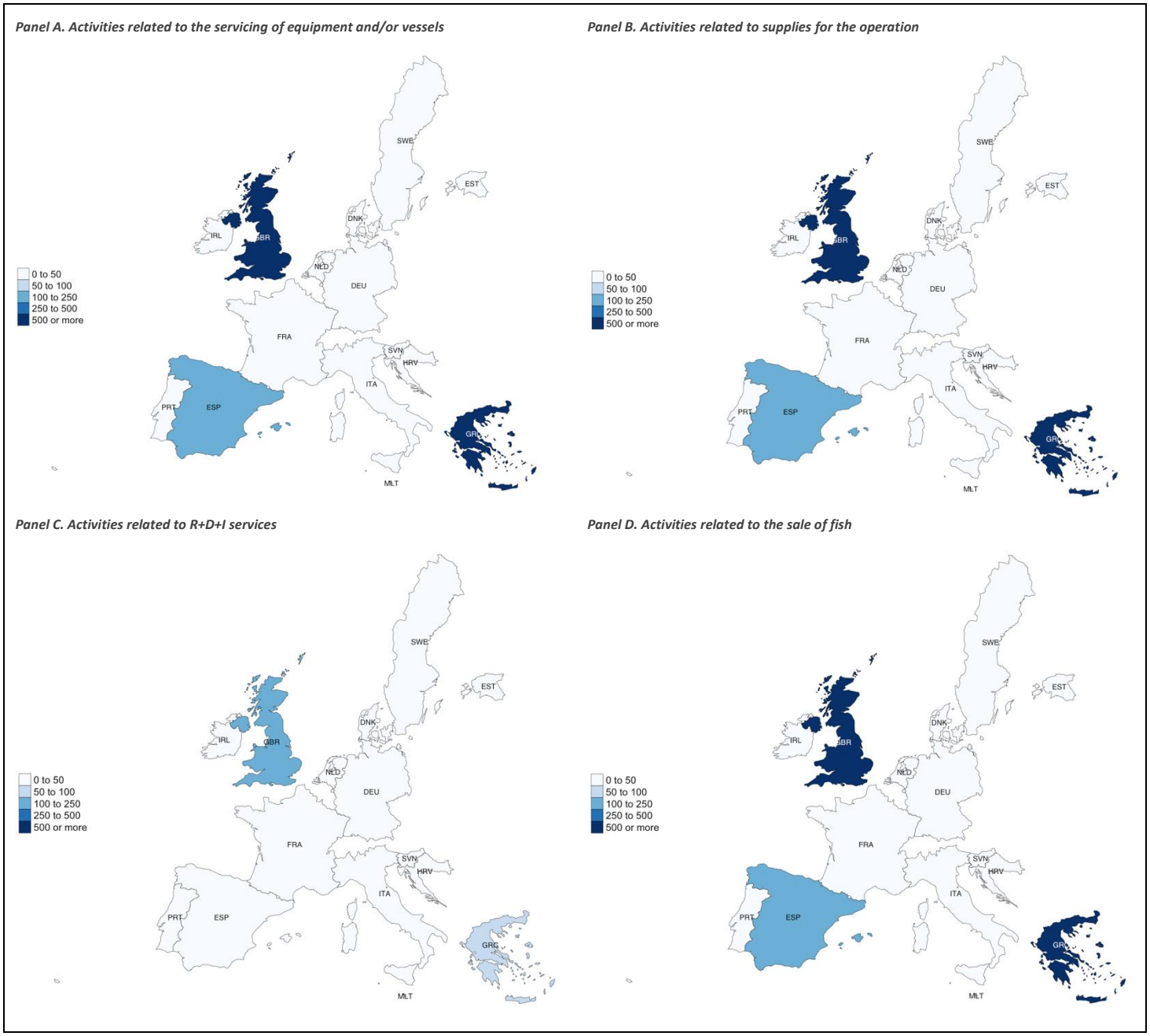

Figure 109. Employment per sub-activity in the sector ancillary to marine finfish aquaculture 2014

V.2.2.2 Other freshwater aquaculture

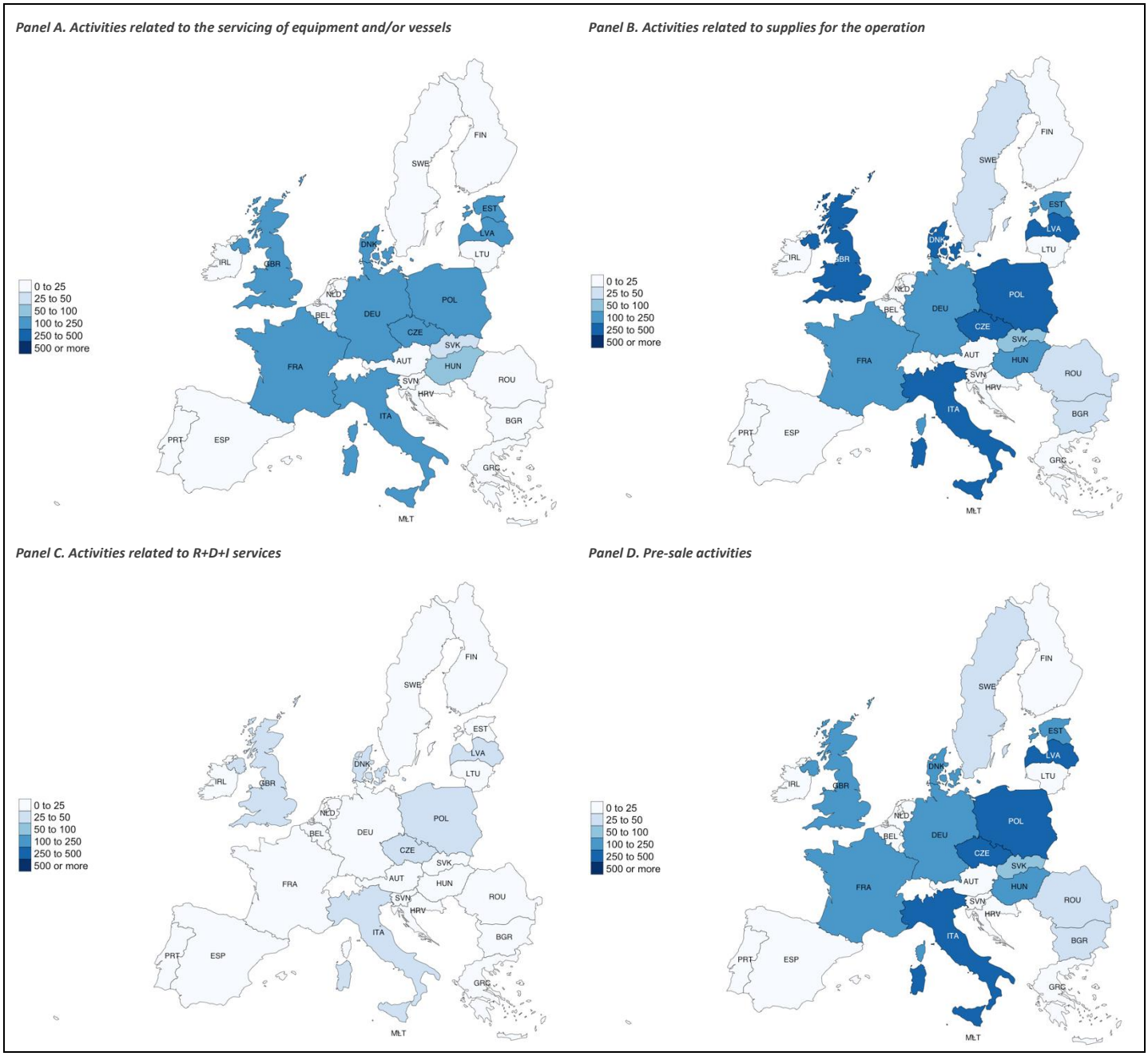

Figure 110. Employment per sub-activity in the sector ancillary to other freshwater aquaculture in 2009

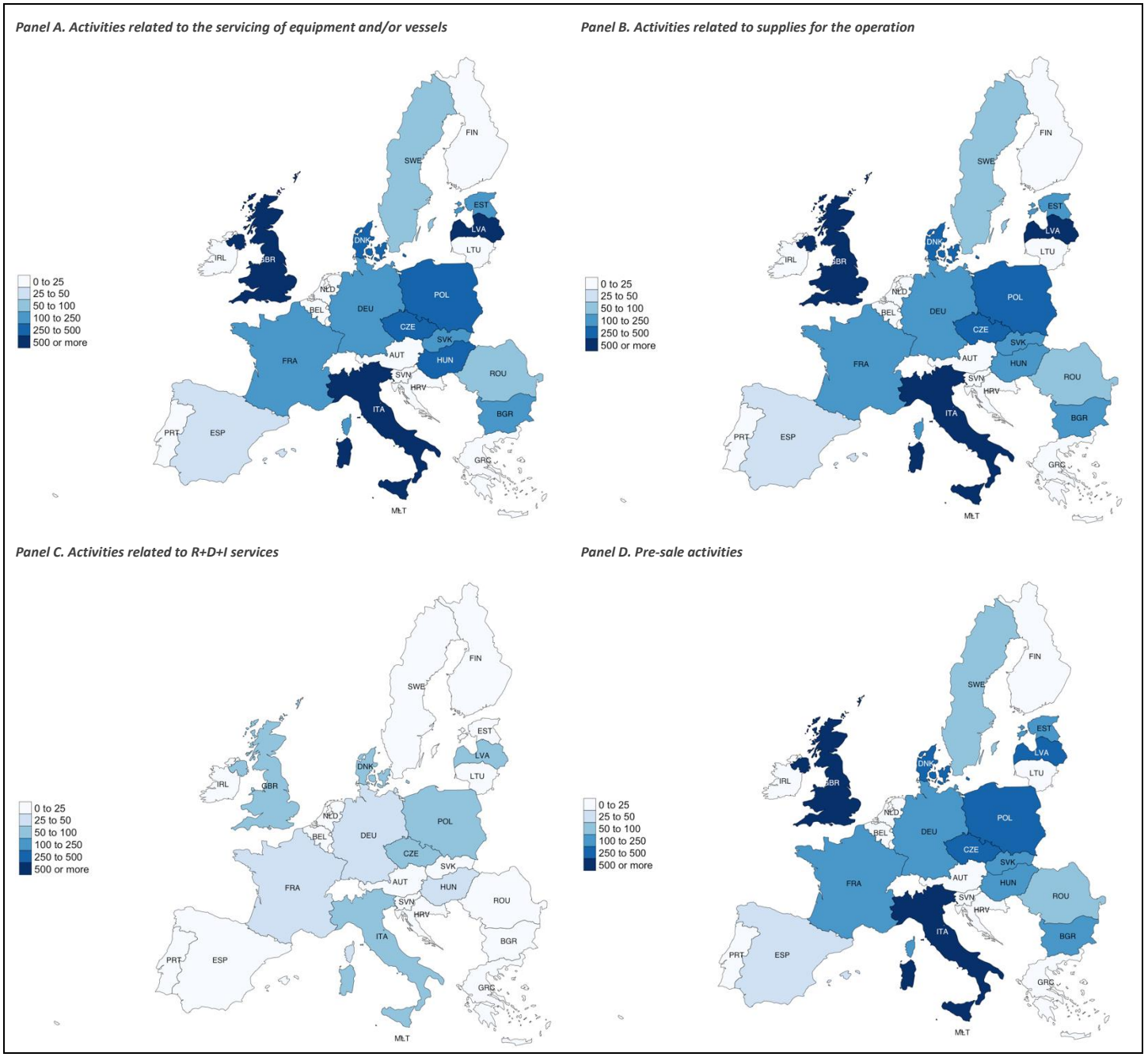

Figure 111. Employment per sub-activity in the sector ancillary to other freshwater aquaculture in 2014

V.2.2.3 Trout freshwater aquaculture

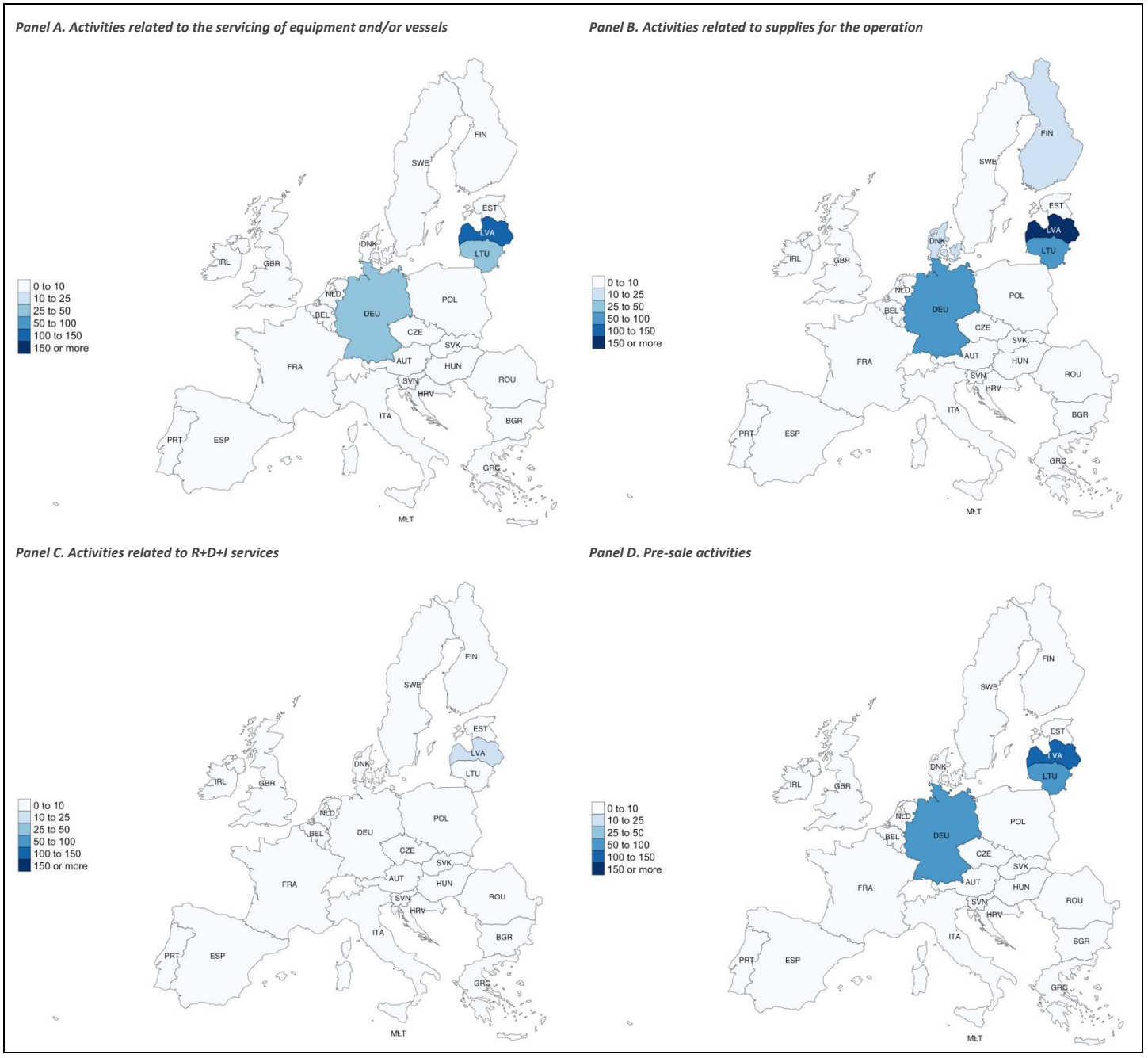

Figure 112. Employment per sub-activity in the sector ancillary to trout freshwater aquaculture in 2009

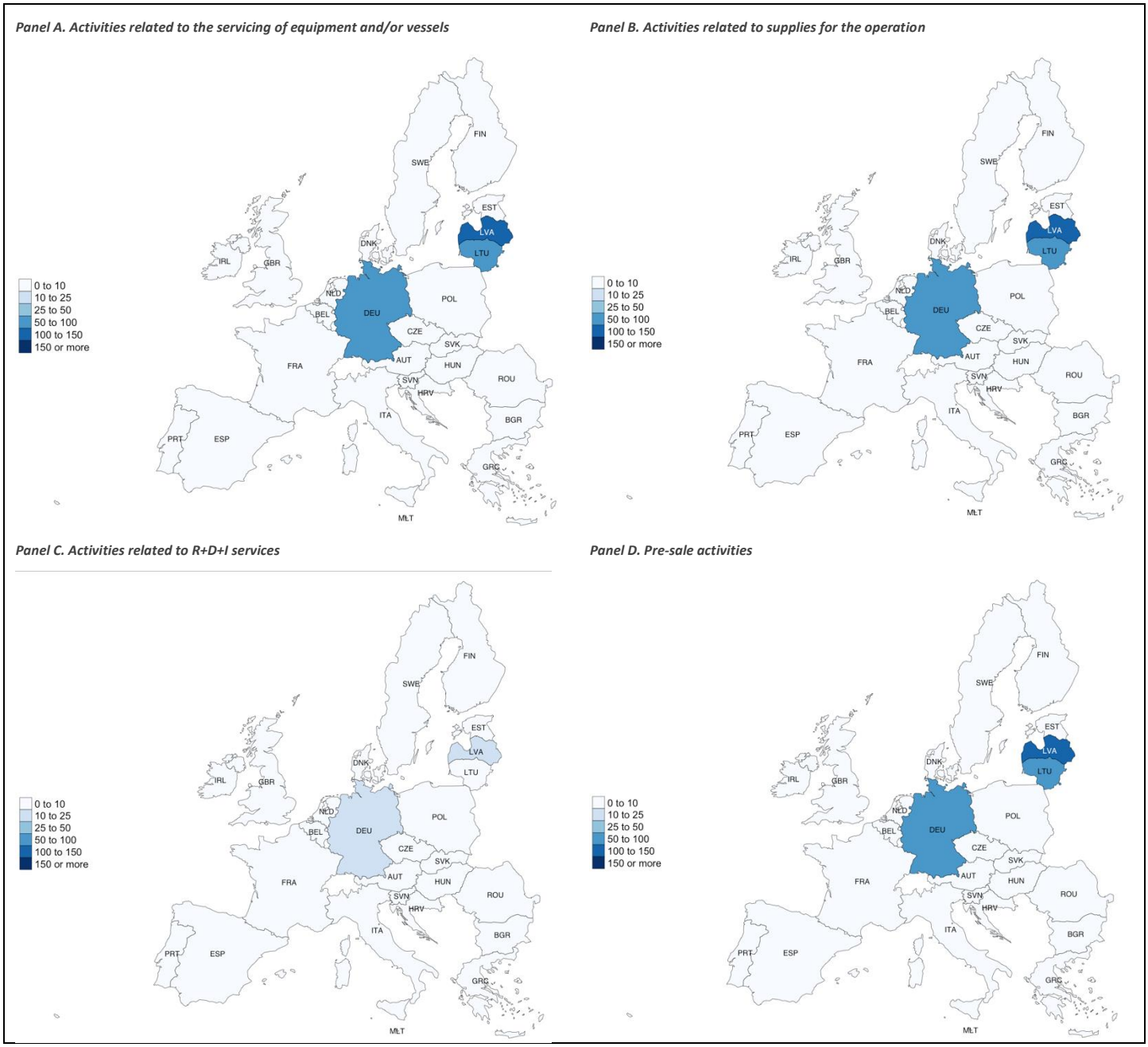

Figure 113. Employment per sub-activity in the sector ancillary to trout freshwater aquaculture in 2014

V.2.2.4 Bivalve aquaculture

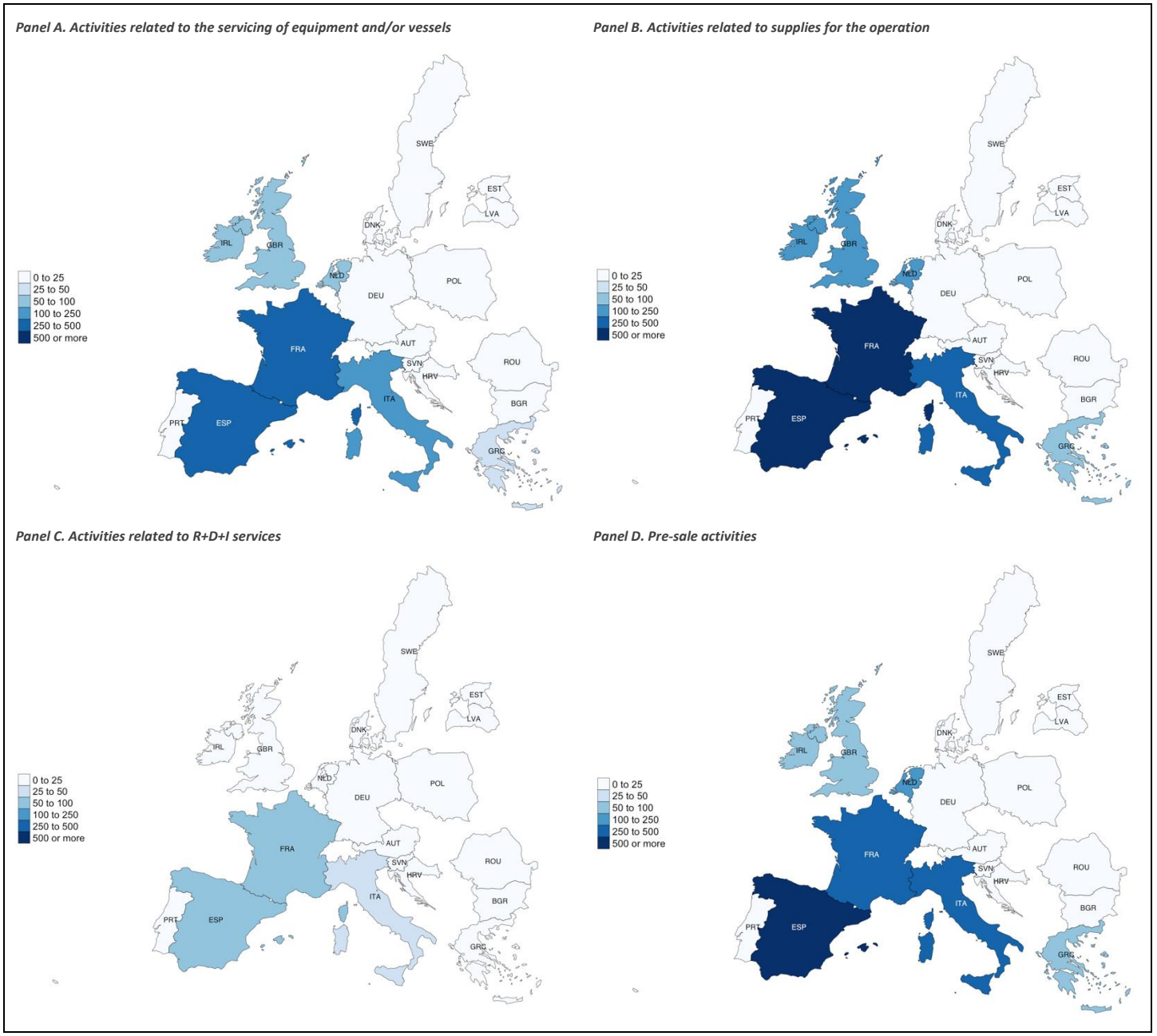

Figure 114. Employment per sub-activity in the sector ancillary to bivalve aquaculture in 2009

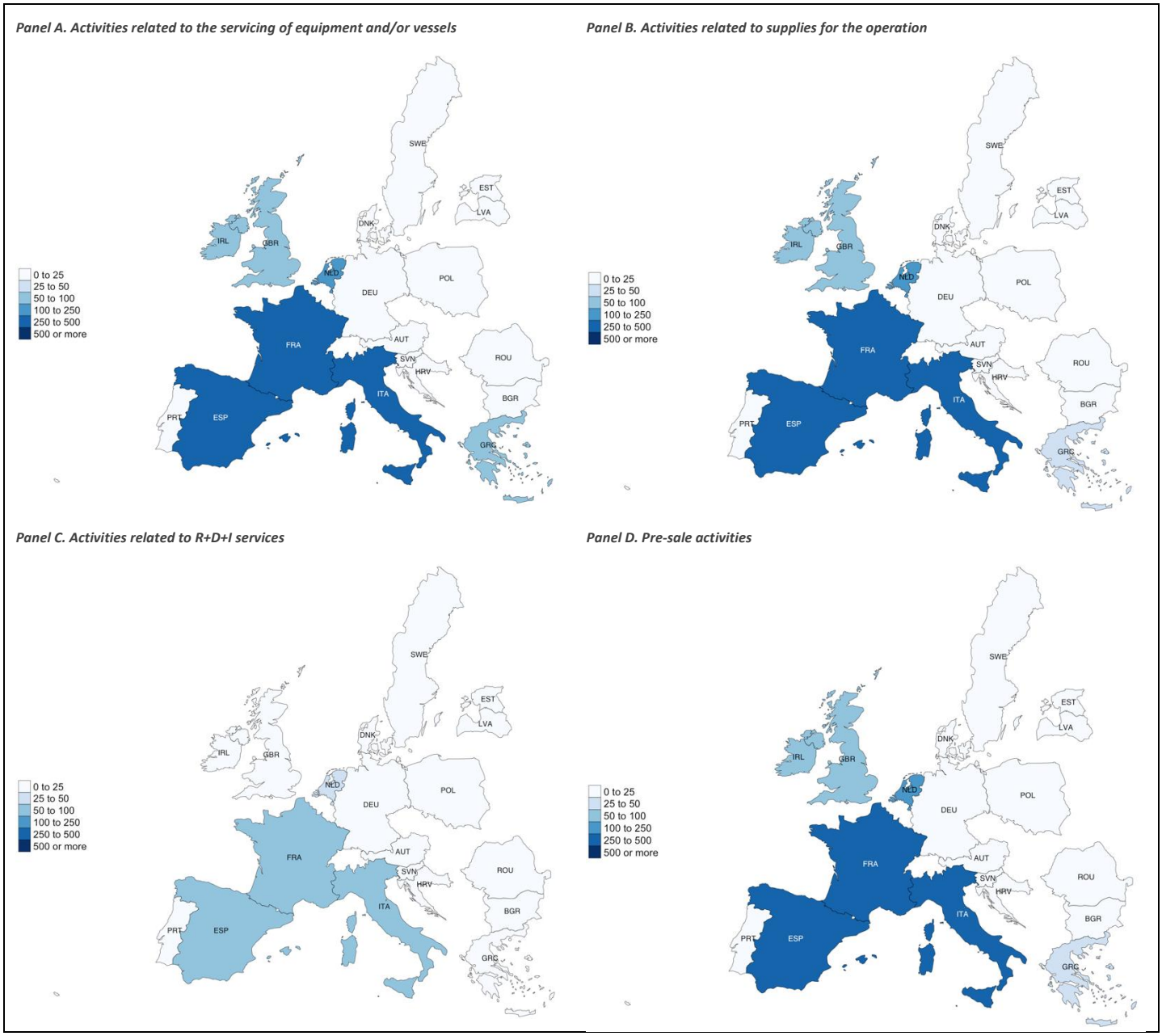

Figure 115. Employment per sub-activity in the sector ancillary to bivalve aquaculture in 2014

Annex VI – List of studies OECD analysis

This Annex presents the results of the desk research looking at employment, income and other socio-economic characteristics related to the countries in scope of this analysis; e.g. Canada, Iceland, Japan, New Zealand, Norway, and the United States. Employment data is presented in A4, income data is presented in A5 and other socio-economic characteristics are presented in A6. Please note that data presented in A4, A5 and A6 are not the results of calculations, but merely present data that haven been found during the desk research.

Some studies found during the desk research also present multipliers; income and employment multipliers. Furthermore, based on data presented in A4 and A5 multipliers can be calculated. In A7 all the multipliers found and calculated during the desk research are presented.

For each study, where possible, a definition of ancillary activities is given to further clarify what is included in the figures that are presented. It should be noted that considering the different definitions applied in the studies, presented figures have to be treated with caution.

Please note that a full list of studies is attached separately to this report in an Excel-file.

Country	National employment	Regional employment	Definitions
Canada	**Study 1:** * Employment figures for 2013 are reported as follows: * 45.904 FTE commercial fish harvesters and crew, * 2.980 FTE in aquaculture production, * 33.034 FTE in seafood product preparation and packaging. **Study 2:** * The direct employment effects were 10.098 jobs for fishing, 4.173 for aquaculture and 22.983 for processing in 2006. * The indirect employment effects were 3.416 jobs for fishing, 2.936 for aquaculture and 7.863 for processing. * The induced employment effects were 3.447 jobs for fishing, 2.012 for aquaculture and 5.625 for processing.	**Nova Scotia:** Nova Scotia counted 606 people employed in aquaculture in 2014: * 247 of which were FTE's, with 163 of those in finfish production and 64 in shellfish production. * 359 of which were employed part-time, with 72 of those in finfish production and 237 of those in shellfish production. **British Columbia (study 1):** Trawl fishing in British Columbia generates: * 1.725 FTE in direct employment, * 865 FTE in indirect + induced employment. **British Columbia (study 2):** The seafood sector contributes: * 12.900 FTE in direct employment. * 4.640 FTE in indirect employment. * 4.030 FTE in induced employment. **British Columbia - North Coast:** Commercial fishing contributes: * 863 to 1.061 FTE.	**Study 1:** * Not explained **Study 2:** * With direct impacts the report means the value that is added/generated in the fisheries industry itself, which is defined as the primary harvesting activities and processing activities. * Indirect impacts are defined as value added/generated that forms in the industries that are responsible for supplying the fishing industry with resources (backward connections, defined in the inception report as upstream) or for example further processing of the industry's products (forward connections, defined in the inception report as downstream) . * With induced impacts is meant the added value that forms in sectors that provide employees of the fishing industry, employees and companies of the ancillary industry and related industries with goods and services. **Nova Scotria:** * Not explained **British Columbia (study 1):** * No exact definitions are provided. **Britishc Columbia (study 2):** * Direct refers to the primary sector. * Indirect refers to downstream activities supporting the primary sector, such as supply, repairs, etc. * Induced refers to the respending of wage incomes earned at the direct and indirect stages. **British Columbia - North Coast:** * Not explained

Country	National employment	Regional employment	Definitions
Iceland	**Study 1:** * Around 5% of Iceland's workforce is employed in the fisheries industry, amounting to around 3.600 people in the fishing sector (and 5.000 in the processing sector) in 2013. * The fisheries industry is mostly (81%) located outside of the greater Reykjavik area, the largest and perhaps only truly urban area in Iceland. The fisheries industry accounts for 11% of all jobs outside of the greater Reykjavik area. **Study 2:** * Around 5% of Iceland's workforce is employed in the fisheries industry, amounting to around 8.600 people (harvesting + processing) in 2010. * 7.225 jobs are estimated to constitute the ancillary sector in 2010. * A further 9.175 jobs are estiamted to be created through induced/ripple effects in 2010. * Total employment (direct, indirect and demand contribution) amounts to around 25.000 jobs in 2010.		**Study 1:** * Not explained **Study 2:** * The report attempts to establish the direct, indirect and demand contribution of the fisheries industry to Iceland's GDP. * With direct contribution the report means the value that is added/generated in the fisheries industry itself, which includes the primary harvesting activities and processing . * Indirect contributions is value added/generated that forms in the industries that are responsible for supplying the fishing industry with resources (backward connections, defined in the inception report as upstream) or for example further processing of the industry's products (forward connections, defined in the inception report as downstream) . * With demand contribution is meant the added value that forms in sectors that provide employees of the fishing industry and related industries with goods and services (this comes close to what other studies generally term as 'induced effects/multipliers').
Japan	**Study 1:** * In Japan, 221.908 people are employed in the primary fishing sector, of which 53% are employed full-time. * For the secondary (distribution and processing) sector 213.159 people are employed, of which 46,5% are employed full-time. **Study 2:** * 200.000 households (with 730.000 people) are dependent on the primary sector as a direct source of income. * 210.000 people in the processing sector are dependent upon fisheries as a direct source of income. * 0,5 to 1 million people are a part of the ancillary sector according to the OECD report. * These figures are for 1998. **Study 3:** * 173.000 workers were employed in marine fishing in 2014. * 87.000 workers were employed in marine finfish aquaculture in 2014. * 146.000 enterprises were active in the primary fisheries industry in 2014. **Study 4:** * 220.000 people were engaged in primary marine fishing activities in 2008. * 215.000 people were engaged in		**Study 1:** * Primary fishing activities are characterized as the actual fishig activities themselves, such as inland fishing or working on a fishing boat. * Secondary activities are designated as processing and distribution activities. * Ancillary activities such as supplies for fisheries, maintenance of fishing vessels and equipment and the like are not explicitly reported in these studies. **Study 2:** * This study does not provide FTE's or the number of people employed from those households. * Ancillary is defined with activities such as transport, distribution, whole sale, retail and supply. This definition goes beyond the first point of sale. **Study 3:** * Workers are defined as people who spent 30 days or more at sea for marine fishing or were involved in marine finfish aquaculture for 30 days or more per year. **Study 4:** * No exact definition of the categories marine fishing, processing and marine fishing related activities on land is given. Marine fishing related activities on land comes closest to ancillary activities, but what this category contains precisely is not clear.

Country	National employment	Regional employment	Definitions
	processing activities in 2008. * 315.000 people were engaged in marine-fishery related activities on land in 2008.		
New Zealand	**Study 1:** * 10.520 FTE in the primary sector (Fishing and Aquaculture) and 16.100 FTE in the secondary sector estimated in 2000. *NOTE: Substantial difference with New Zealand's own data (7.000 FTE primary, no direct data on ancillary). **Study 2:** * Around 7.000 people work in marine fishing and aquaculture in New Zealand, or 1% of the total workforce. * This figure has remained roughly the same over the last 10 years.	**Hauraki Gulf:** * Total employment for the entire Hauraki Gulf region economy is around ~670.000 people employed (this accounts for all industries). **Hauraki Gulf (Aquaculture in Auckland):** * In Auckland, 66 FTE are directly involved in aquaculture farming, with 37 FTE associated indirect (ancillary) employment. * For Aquaculture processing, 275 FTE are directly involved, with 104 FTE indirect (ancillary) employment. **Hauraki Gulf (Aquaculture in Waikato):** * Aquaculture in the Waikato region has the following impact (employment-wise) on the New Zealand economy. * In Aquaculture farming, 121,1 FTE are directly involved, with 117,7 FTE indirectly involved (ancillary). * In aquaculture processing, 430 FTE are directly involved, with 259,7 FTE indirectly invovled (ancillary). **Hauraki Gulf (Commercial Fishing in the entire Gulf):** * Commercial fishing is estimated at 821 FTE direct employment in Auckland and 362 FTE in Waikato, leading to 1.183 FTE for the Hauraki Gulf. **Coromandel:** * Direct regional employment: 297 (121 in farming, 176 in processing). * Total employment in the region including indirect and induced jobs: 432 (158 from farming, 274 from processing). * National direct employment: 551. * National total employment: 1193.	**National (Study 1):** * Not explained. **National (Study 2):** * Not explained. **Hauraki Gulf:** * Employment is a headcount of all salary and wage earners. **Hauraki Gulf (Aquaculture in Auckland):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing. **Hauraki Gulf (Aquaculture in Waikato):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing. **Coromandel:** * Not explained

Country	National employment	Regional employment	Definitions
Norway	**Study 1:** * 9.825 people were employed as fishermen (sole occupation) in 2012. * The Ministry report also mentions that 2.226 people were employed in fishing as their secondary occupation in 2012. **Study 2:** * 9.696 people were employed in fishing in 2014. **Study 3:** * 5.759 workers were involved in the production of salmon and trout in 2014, up from 3.129 in 2004, a 84% increase. **Study 4:** * For the fisheries value chain, which includes the catch, processing, export/trade and suppliers of services and equipment for the value chain, the report notes 24.200 FTE's for 2010. * For the aquaculture value chain this was 21.100 FTE in 2010. **Study 5:** * €9,3 billion in turnover: €5,4 billion in the core activities and €3,9 billion in other industries. * €3,2 billion in value added (contribution to GNP): €1,7 billion in the core activities and €1,5 billion in other industries.		**Study 1:** * Unclear whether employment figures are FTE based. **Study 2:** * Not explained **Study 3:** * Employment figures are based on the number of people employed with aquaculture as their sole occupation, not FTE. **Study 4:** * Not explained **Study 5:** * Core activities are defined in the report as the combination of fishing, aquaculture, processing and wholesale

Country	National employment	Regional employment	Definitions
United States	**Study 1:** * Total employment in the seafood sector in the United States, taking into account the entire sector (primary and anicllary acivities), came in at 1,27 million jobs (full-time and part-time) in 2012. Up from 1 million jobs in 2009. * Of these 1,27 million jobs, the primary sector was responsible for 175.000 jobs, processors and dealers for 220.000 jobs, importers for 210.000 jobs, wholesalers and distributors for 55.000 jobs and retailers for 610.000 jobs. **Study 2:** * 39.500 people were employed either directly or indirectly in the aquaculture sector in 2007. * 10.000 of those were employed in the primary sector. * 30.000 of those were employed in the ancillary sector. **Study 3:** * There were 830 processing plants, employing 37.372 people in 2014. * There were 2.379 wholesalers, employing 24.423 people in 2014. **Study 4:** * The U.S. Bureau of Labor Statistics projects a 5% decrease in jobs in the fishery industry from 2012 to 2022. **Study 5:** * The potential economic impact of offshore aquaculture in the United States is estimated as follows: * New jobs generated 33% would be in the primary farming activity, and * 67% would be in downstream activities.	**Bristol Bay:** Looking at Bristol Bay, one of the most important salmon fisheries in Alaska, the figures are as follows : * 1.987 FTE in direct employment (this figure includes both the primary sector and processing sector). * 5.582 FTE in indirect + induced employment. * 7.839 FTE total employment. **Alaska:** * In Alaska the monthly average employment over 2012 was reported as 8.189 FTE. Interesting to note is that the actual employment differs vastly per month, due to the seasonality of the fishing industry: * 2.923 FTE in January 2012, * 24.761 FTE at the peak in July 2012, * 853 FTE at the lowest level in December 2012. **New Jersey:** * In New Jersey, the primary commercial fishing industry accounts for almost 3.000 jobs. **Washington and California:** * Shellfish aquaculture direct employment was given as 1.900 jobs in Washington and 200 jobs in California. * Indirect + induced employment was given as 810 jobs in Washington and 80 jobs in California. **Seattle:** In 2013, 520 fishing boats were moored at Fisherman's Terminal in the port, and 69 were moored at Terminal 91 in the port. These fishing vessels made purchases in the following ancillary areas Shipyard repair services, Painting, Electronic equipment, Engine and propulsion services, Fishing gear, Packaging material, Fuel, Insurance, Legal services, Ship stores (food and supplies for the crew.	**Study 1:** * Primary fishing activities are characterized as the harvesting of fish. * Ancillary activities are characterized as activities supporting the primary fishing activities, such as supplies, processing, distribution and sales. It is important to note that this is beyond the first point of sale. * Due to the nature of the study we cannot speak of FTE. **Study 2 - 5:** * Not explained **Bristol Bay:** * The multiplier economic impacts of Bristol Bay salmon fishing and processing are the indirect and induced employment, income and output value resulting from the fishing and processing that occurs in Bristol Bay. **Alaska:** * Not explained **New Jersey:** * Not explaind **Washington & California:** * Indirect impacts quantify the effect of spending within the study region on supplies, services, labor, and taxes. Induced impacts measure the money re-spent in the study area as a result of the indirect impacts. Direct, indirect, and induced impacts sum to the total economic impacts of a project or industry. * It is unclear from the study whether the jobs figures are in FTE. **Seattle:** * Not explained

Figure A4. Results desk research – Employment

Country	National income	Regional income	Definitions

Country	National income	Regional income	Definitions
Canada	**Study 1:** * The primary fishery and aquaculture industry contributed around 0,18% to Canada's GDP in 2013. * The most important species fished, by far, are shellfish, representing about 50% of the total landings volume, and 80% of the total landings value over 2013. * Aquaculture is most prominent in the British Columbia province of Canada, with about 90% of aquaculture production value and 80% of production volume originating there. * Fisheries and Oceans Canada reports that around 865.000 tonnes of fish was landed for a value of €1,6 billion in 2013. * Aquaculture production accounted for around 170.000 tonnes representing a value of €680 million. * Although the product preparation and packaging industry is out of scope (since it includes processing), it is worth noting that €3,2 billion is generated in that sector. **Study 2:** * €55 million was generated through commercial freshwater fisheries (such as lake Winnepeg and the Great lakes), representing around 28 thousand tonnes of catch volume. **Study 3:** * The economic value of spending on wild salmon related activities is €109,5 million in Canada. * Most spending, by far, occurs in recreational fishing, but smaller amounts are spent on salmon related research activities, governmental policy and regulation and by NGO's. * The report estimates that the level of salmon related spending reported above generates 3.873 FTE and €83 million worth of income. **Study 4:** * On the international markets, Canada is one of smaller producers of fish, ranking 22nd for fisheries and 27th for aquaculture in 2008. * Salmon is by far the most valuable species farmed. **Study 5:** * The direct contribution to the GDP was €1,6 billion in 2006, consisting of around €655 million from fishing, around €205 million from aquaculture and around €655 million from processing. * The indirect impacts were around €700 million to the GDP in 2006, of which around €155 million from fishing, around €145 million from aquaculture and around €400 from processing. * For induced impacts this was around €520 million to the GDP in 2006, of which around €210 million from fishing, around	**British Columbia (Study 1):** Trawl fishing in British Columbia generates: * €98,5 million in revenue, * €46,5 million in direct wages, * €23 million in indirect+induced wages. **British Columbia (Study 2):** The seafood sector contributes: * €521 million to GDP directly. * €165 million to GDP indirectly. * €172 million to GDP through induced effects. * €313 million to Labour Income directly. * €119 million to Labour Income indirectly. * €106 million to Labour Income through induced effects. **British Columbia - North Coast:** Commercial fishing contributes: * €102 million to €125 million in output value. * €49 million to €60 million in contribution to GDP.	**Study 1 - 4:** * Not explained **Study 5:** * With direct impacts the report means the value that is added/generated in the fisheries industry itself, which is defined as the primary harvesting activities and processing activities. * Indirect impacts are defined as value added/generated that forms in the industries that are responsible for supplying the fishing industry with resources (backward connections, defined in the inception report as upstream) or for example further processing of the industry's products (forward connections, defined in the inception report as downstream) . * With induced impacts is meant the added value that forms in sectors that provide employees of the fishing industry, employees and companies of the ancillary industry and related industries with goods and services. * Note that the definition of indirect does not entirely correspond with ancillary activities as defined in the inception report, because indirect effects go beyond the first point of sale. **British Columbia (Study 1):** * Not explained **British Columbia (Study 2):** * Direct refers to the primary sector. * Indirect refers to downstream activities supporting the primary sector, such as supply, repairs, etc. * Induced refers to the respending of wage incomes earned at the direct and indirect stages. **British Columbia - North Coast:** * Not explained

Country	National income	Regional income	Definitions
	€100 million from aquaculture and around €210 from processing.		
Global	**Study 1:** * For many nations, the fishing industry contributes a relatively small amount to gross domestic product or value added with the majority reporting contributions less than 1% of GDP. * The total economic impact of global fisheries for 2003 is estimated to be between €221,5 and €225,6 billion.		**Study 1:** * The report makes a distinction only between primary and secondary activities. * Primary activities are defined as harvesting. * Economic impact is defined as direct + indirect + induced effects. Direct being defined as primary harvesting, indirect being defined as activities in the fisheries value chain and induced being defined as activities supporting or related to the fisheries value chain.
Iceland	**Study 1:** * Fisheries caught 1.367 thousand tonnes in 2013, with a value of €0,97 billion. * In 2014, 10.76 thousand tonnes was caught, with a value of €1,08 billion. **Study 2:** * Statistics Iceland gives a figure of 1.362 thousand tonnes for 2013, and 1.076 thousand tonnes for 2014. * Generating €0,97 billion in 2013 and €1,08 billion in 2014 respectively. **Study 3:** * In 1981, cod catch was 460.000 tonnes worth €319 million euro ($340 million USD, as stated in the report, for an exchange rate of 1 Euro to around 1,06 USD). * In 2011 the catch was 180.000 tonnes, worth €637 million. * According to the Iceland Ocean Cluster, this increase in export value is mostly due to the modernization of the fishing industry, focusing on utilization and advanced products, such as fish liver oil. **Study 4:** * According to Islandsbanki, fishing was responsible for 6,3% of Iceland's GDP in 2013, with processing contributing an additional 3,7% to GDP . * The average contribution to GDP of the seafood sector (defined as fishing + processing in the report) over the last 10 years (2003-2013) was 8,5%. **Study 5:** * Aquaculture production was around 6.000 tonnes in 2010 at a value of €21,4 million. * The fisheries industry's direct contribution to GDP was 10,2% in 2010, with 5,7% attributed to fishing and 4,5% attributed to processing. * The indirect contribution of the fisheries industry to GDP is estimated as 7,3% for 2010. * The demand effect was estimated to contribute approximately 7% to Iceland's		**Study 1 - 4:** * Not explained **Study 5:** * The report attempts to establish the direct, indirect and demand contribution of the fisheries industry to Iceland's GDP. * With direct contribution the report means the value that is added/generated in the fisheries industry itself, which includes the primary harvesting activities and processing . * Indirect contributions is value added/generated that forms in the industries that are responsible for supplying the fishing industry with resources (backward connections, defined in the inception report as upstream) or for example further processing of the industry's products (forward connections, defined in the inception report as downstream) . * With demand contribution is meant the added value that forms in sectors that provide employees of the fishing industry and related industries with goods and services (this comes close to what other studies generally term as 'induced effects/multipliers').

Country	National income	Regional income	Definitions
	GDP in 2010.		
Japan	**Study 1:** * Japans primary fishing sector (including marine and inland fisheries and aquaculture) generated €11,2 billion in 2010. * Of this, €7,9 billion is attributed to fishery and €3,3 billion to marine finfish aquaculture. * The fishing industry contributed about 0.2% to the national GDP in 2009		**Study 1:** * Primary fishing activities are characterized as the actual fishig activities themselves, such as inland fishing or working on a fishing boat. * Secondary activities are designated as processing and distribution activities. * Ancillary activities such as supplies for fisheries, maintenance of fishing vessels and equipment and the like are not explicitly reported in these studies.
New Zealand	**Study 1:** *The gross value of fisheries output in 2000 was estimated at €1,2 billion. **Study 2:** * New Zealand's fisheries are responsible for about 0,7% of New Zealand's GDP. * New Zealand's fish exports contributed €865 million in earnings over the year 2009, * Compared to €819 for the year 2000, which amounts to a 6% increase from 2000 to 2009.	**Hauraki Gulf (Aquaculture in Auckland):** * In Auckland, aquaculture farming generated €9,2 million. * Aquaculture processing generated €53,1 million. * Associated ancillary activities generated €6,4 million for aquaculture farming, and €19,9 million for aquacuture processing respectively. **Hauraki Gulf (Aquaculture in Waikato):** * In Waikato aquaculture farming generated €31,9 million. * Aquaculture processing generated €32,1 million. * Associated ancillary activities generated €5,4 million for aquaculture farming, and €13 million for aquacuture processing respectively. **Hauraki Gulf (Commercial Fishing in the entire Gulf):** * The associated income generated is €39 million, which includes domestic and export revenues. **Coromandel:** * Total production: 31,000 tonnes of mussels and 400 tonnes of oysters. * Total output of the industry within the region: €43,2 million (total value of sales). * Contribution to the regional domestic product (mussels and oysters): €18,6 million (€9 million from farming, €9,5 million from processing). * Contribution to the nation's GDP: €46,2 million (€14,4 from farming, €31,8 from processing). * Contribution to regional household income (wages) is €6,4 million (indirect and induced household income is another €3,6 million).	**Study 1 - 2:** * Not explained. **Hauraki Gulf (Aquaculture in Auckland):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing. **Hauraki Gulf (Aquaculture in Waikato):** * Direct was defined as any initial injections of revenues and expenditure that accrue in aquaculture farming and processing. * Indirect was defined as activities resulting from expenditure within aquaculture farming and processing; e.g., the provision of goods and services to aquaculture farming and processing. **Hauraki Gulf (Commercial Fishing in the entire Gulf):** * Not explained **Coromandel:** * Not explained

Country	National income	Regional income	Definitions
Norway	**Study 1:** * In 1930, the fishery industry contributed 5,7% of the national GDP. * In 2002 this was down to 0,7%, indicating that the fishing industry's economic importance has declined significantly. **Study 2:** * 2,3 million tonnes of fish was caught in 2014. A 10,7% increase from 2013, but an 8,8% decrease from 2009. * The value of these landings was €1,56 billion in 2014. **Study 3:** * Looking at aquaculture 1,3 million tonnes of fish was produced in 2014, 94,5% of which was salmon. * The value of the aquaculture production over 2014 was €4,8 billion, a 9,5% increase over 2013 **Study 4:** * For the fisheries value chain, which includes the catch, processing, export/trade and suppliers of services and equipment for the value chain, the report notes €2,2 billion for 2010. * For the aquaculture value chain this was €2,9 billion for 2010. **Study 5:** For aquaculture salmon production a number of costs have changed in the Norwegian industry between 2000 and 2010: * Feed costs for aquaculture have increased by 31% over that period. Salary costs have increased by 11%, production costs have risen 37%. * However, other things like insurance costs have come down (insurance by 40%). * Overall, this results in a 24% increase in the total costs per kilogram in 2010 . * In the end, the industry seems to have failed to improve efficiency, and the high market value for salmon (3,8 billion Euros in 2010) was related solely to favourable market,		**Study 1:** * Not explained. **Study 2:** * Employment figures are based on the number of people employed with fishing as their sole occupation, not FTE. **Study 3:** * Employment figures are based on the number of people employed with aquaculture as their sole occupation, not FTE. **Study 4:** * Other industries is not specified further, which means that it is difficult to gauge the multipliers with respect to the definitions in the inception report. **Study 5:** * Not explained

Country	National income	Regional income	Definitions
United States	**Study 1:** * The primary fishing sector (accounting for all 175.000 jobs) generated total landings of €4,8 billion. Up from €3,7 billion in 2009. * Seafood retailers contributed €30 billion in sales impacts, €12,1 billion in income, and €16,5 billion in value added impacts to the national economy in 2012. * The seafood import sector, which generated the largest sales impacts, contributed €53,5 billion in sales impacts, over €8,5 billion in income, and €16,2 billion in value added impacts. * Wholesalers and distributors constituted the smallest of the seafood industry sectors at almost €7,5 billion in sales, €2,4 billion in income, and €3,3 billion in value added impacts to the national economy. **Study 2:** * In 2008, around €0,9 billion was generated from aquaculture. **Study 3:** * The median annual wage for fishing workers was around €31.400 in May 2012, only slightly lower than the median annual wage for all occupations. **Study 4:** * The United States' National Fish and Wildlife Foundation has set up the Fisheries Innovation Fund in order to increase revenue and provide additional access and fishing opportunities for commercial and recreational fisheries . The fund is aimed at improving both economic and societal aspects associated with fishing. The fund has awarded around €7 million to 67 projects . No quantitative data on the results was found, but recipients said the grant money helped them to support the fishing community in business goals and reducing bycatch. **Study 5:** * Of the 1.260 vessels delivered in 2013 by the totality of registered shipyards in the United States, 15 were commercial fishing vessels, amounting to 1,2% of all vessels delivered that year according to the Maritime Administration.	**Bristol Bay:** * €155 million in direct harvest output value. * €367 million in direct harvest + processing output value, of which €135 million was labor income for fishermen. * €753 million in indirect + induced output value, of which €252 million was labor income. **New Jersey:** * Around €114 million in revenue was generated from the catch sold directly by fishermen. **Washington and California:** * The direct output was €95,3 million in Washington and €11,2 million in California. * The indirect + induced output was €173 million in Washington and €21,8 million in California. * The direct labour income was €35 million in Washington and €5,1 million in California. * The indirec + induced labour income was €37,5 million in Washington and €4,3 million in California.	**Study 1:** * Primary fishing activities are characterized as the harvesting of fish. * Ancillary activities are characterized as activities supporting the primary fishing activities, such as supplies, processing, distribution and sales. It is important to note that this is beyond the first point of sale, which means that this figure does not correspond with the definition of ancillary activities as defined in the inception report (it is much larger). * Due to the nature of the study we cannot speak of FTE. **Study 2 - 5:** * Not explained **Bristol Bay:** * The multiplier economic impacts of Bristol Bay salmon fishing and processing are the indirect and induced employment, income and output value resulting from the fishing and processing that occurs in Bristol Bay. **New Jersey:** * Not explained **Washington and California:** * Indirect impacts quantify the effect of spending within the study region on supplies, services, labor, and taxes. Induced impacts measure the money re-spent in the study area as a result of the indirect impacts. Direct, indirect, and induced impacts sum to the total economic impacts of a project or industry. * It is unclear from the study whether the jobs figures are in FTE.

Figure A5. Results desk research – Income

Country	National other socio-economic data	Definitions
Canada	**Study 1:** * Fishermen in Canada are generally well organized with large unions available to represent them.	**Study 1:** * Not explained
Iceland	**Study 1:** * Around 33% of all workers employed in the fisheries industry is female (around 2.800 in absolute numbers). * 87% of those female employees works in the processing sector (around 2.400 in 2013).	**Study 1:** * Not explained
Japan	**Study 1:** * The primary fishing activities are characterized by an overrepresentation of male workers (85%), while the secondary activities such as processing and distribution are characterized by a smaller overrepresentation of female workers (63%).	**Study 1:** * Primary fishing activities are characterized as the actual fishig activities themselves, such as inland fishing or working on a fishing boat. * Secondary activities are designated as processing and distribution activities. * Ancillary activities such as supplies for fisheries, maintenance of fishing vessels and equipment and the like are not explicitly reported in these studies.
New Zealand	**Study 1:** * In New Zealand, about 34% of the fishing industry workforce are women. **Study 2:** * The fisheries workforce is predominantly male in New Zealand at 80%, compared to 53% in the total workforce. * Additionally, it should be noted that the fisheries sector employs twice as many Maori workers as any other industry in New Zealand.	**Study 1 - 2:** * Not explained.
United States	**Study 1:** * The primary fishing activities are characterized by an overrepresentation of male workers (85%), while the secondary activities such as processing and distribution are characterized by a smaller overrepresentation of female workers (63%). **Study 2:** * According to the Bureau of Labor Statistics, the fishing and aquaculture industries are characterized by an overrepresentation of male workers.	**Study 1:** * Primary fishing activities are characterized as the harvesting of fish. * Ancillary activities are characterized as activities supporting the primary fishing activities, such as supplies, processing, distribution and sales. It is important to note that this is beyond the first point of sale, which means that this figure does not correspond with the definition of ancillary activities as defined in the inception report (it is much larger). * Due to the nature of the study we cannot speak of FTE. **Study 2:** * Not explained

Figure A6. Results desk research - Other socio-economic characteristics

Annex VII OECD analysis per country

VII.1 Analysis of activities ancillary to marine fishing and aquaculture in Canada

Analysis on the primary sector

Fisheries and aquaculture in Canada are managed by the Department of Fisheries and Oceans Canada. It is the lead federal government department responsible for developing and implementing policies and programmes in support of Canada's economic, ecological and scientific interests in oceans and inland waters. This mandate includes responsibility for the conservation and sustainable use of Canada's fisheries resources[149]. Overall, the primary fishery and aquaculture industry contributed around 0,18% to Canada's GDP in 2013[150]. Internationally, Canada ranked 22nd for fisheries and 27th for aquaculture in terms of tonnage produced in 2008[151].

Canada's commercial fisheries operate in three broad regions: along the Atlantic coast, the Pacific coast and its inland waters (mainly near the Great Lakes and Lake Winnipeg, situated in the lower central region)(see *Figure 116*)[152]

Figure 116. Administrative sectors of Fisheries and Oceans Canada

The Atlantic region is the most important fishing region, responsible for about 83% of total landings volume and 89% in landing value in 2013[153]. The most important species are shellfish, representing about 50% of the total landings volume, and 80% of the total landings value in 2013[154]. These figures are reflected in the choice of fishing gear, with traps and pots being the most prominently used (in 56% of all fishery activities), followed by trawls at 20%[155].

149 FAO (2013), *Marine Sub-sector - Fishing communities*, http://www.fao.org/fishery/facp/CAN/en.

150 Calculated from http://www.tradingeconomics.com/canada/gdp and Fisheries and Oceans Canada (2014), *Canada's Fisheries – Fast Facts 2014*, p2.

151 Fisheries and Oceans Canada (2011), *Canadian Fisheries Statistics 2008*, p10-11.

152 FAO (2013), *Country brief*, http://www.fao.org/fishery/facp/CAN/en.

153 Fisheries and Oceans Canada (2014), *Canada's Fisheries – Fast Facts 2014*, p4.

154 Fisheries and Oceans Canada (2014), *Canada's Fisheries – Fast Facts 2014*, p4.

155 Fisheries and Oceans Canada (2011), *Canadian Fisheries Statistics 2008*, p15.

Overall, Fisheries and Oceans Canada reports that around 865.000 tonnes of fish was landed for a value of €1,6[156] billion in 2013. Additional data indicates that around €55 million was generated through commercial freshwater fisheries (such as lake Winnipeg and the Great lakes)[157].

Looking at aquaculture, this type of activity is most prominent in the British Columbia province of Canada (see *Figure 117*),with about 90% of aquaculture production value and 80% of production volume in 2013[158]. Salmon is the most important species farmed, at 66% of total value and 58% of total volume[159]. In figures, aquaculture production accounted for around 170.000 tonnes representing a value of €680 million[160].

In conclusion, the fishing industry in Canada primarily consists of marine fishing activities (69%), followed by aquaculture (29%) and inland fishing (2%).

Figure 117. British Columbia in Canada

Looking at employment, about 45.904 FTE is employed in the fishing sector in Canada and 2.980 in the aquaculture sector in 2014. Looking at trends in the past years, what is observed that the production volumes have dropped, while production value has increased significantly; from 1990 to 2011 the landed value increase with 41%, while volume dropped with 48%. This drop seems to be caused by a shift from less valuable species (finfish) to species with a higher overall value such as shellfish. Indeed, shellfish production increased with 72% in volume and 220% in value from 1990 to 2011[161].

The development in employment also shows a negative trend, where 720 FTE disappeared between 2009 and 2013. This decline can be fully attributed to the aquaculture sector, where employment in marine fishing was relatively stable. The reason for this decline is not found in literature, but it seems to be related to an increase in efficiency in the industry, since overall production has increased with 20.000 tonnes from 2010 to 2013.

156 At an exchange rate of 1,42 Canadian dollars for 1 Euro.

157 Fisheries and Oceans Canada (2013), *Commercial Fisheries – Freshwater*, http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/freshwater-eaudouce/2013-eng.htm.

158 Fisheries and Oceans Canada (2014), *Canada's Fisheries – Fast Facts 2014*, p5.

159 Fisheries and Oceans Canada (2014), *Canada's Fisheries – Fast Facts 2014*, p5.

160 Fisheries and Oceans Canada (2014), *Canada's Fisheries – Fast Facts 2014*, p2-3.

161 Calculated from the above, and Fisheries and Oceans Canada (2010), *Canada's Fisheries – Fast Facts 2010*, p2.

Where innovation is concerned, Fisheries and Oceans Canada and Genome Canada are looking at solving sector challenges in innovative ways. A few areas of interest are related to fish migration, biodiversity and population genetics for fishing, site productivity, biophysical capacity assessment and fishery and aquaculture interactions[162]. Examples of innovative solutions include the development of disease resistant strains of Atlantic salmon and the development of a microarray chip to monitor wild salmon stock which is used in over 70 labs worldwide[163]. Unfortunately, no quantitative results on the effects of these innovations on the primary sector were found.

Analysis on the ancillary sector and its relationship with the primary sector

When looking at the sector ancillary to marine fishing and aquaculture in Canada, studies found contained a lot of different definitions looking at the definition of the ancillary industry. Therefore, it has been proven difficult to compare figures between studies and between the results found in the case studies in the EU. Hence, one should treat the figures presented in this paragraph with caution, since differences between presented data can be the result of different definitions, rather than real differences in the ancillary sector. Nevertheless, studies found present useful data and give an idea on the overall economic importance of the sector ancillary to marine fishing and aquaculture in Canada.

Fisheries and Oceans Canada researched the ancillary sector and found that 155 million Euros was generated in the sector ancillary to fishing[164] and 145 million Euros in the sector ancillary to aquaculture in 2006 (see *Figure 118*). In other words, per Euro generated in the primary sector in fishing, 0,24 Euro is generated in the sectors that are ancillary to fishing. Looking at aquaculture, this is higher, where about 0,70 Euro is generated per Euro generated in the aquaculture sector. Please note that this includes activities further than the first point of sales (i.e. all downstream activities have been included from services directly related to the primary production (such as auctions) to activities that involve selling the product to the end-consumer (e.g. supermarkets))[165].

	Fishing	Aquaculture	Processing	Seafood sector
Primary sector	655	205	655	1.600
Ancillary sector	155	145	400	700
Induced impact	210	100	210	520

Figure 118. Seafood sector contribution to GDP in million Euros in 2006

Looking at employment, Fisheries and Oceans Canada concludes – using again another definition of the ancillary sector – that 3.416 FTE is employed in the ancillary sector in Canada[166], against 10.098 FTE in the primary sector looking at fishing[167] (see *Figure 119*). With respect to aquaculture, 2.936 FTE is employed, against 4.173 in the primary sector. Hence, ~0,34 FTE is employed per FTE in fishing and ~0,70 FTE is employed per FTE in aquaculture[168].

	Fishing	Aquaculture	Processing	Seafood sector
Primary sector	10.098	4.173	22.983	37.255
Ancillary sector	3.416	2.936	7.863	14.215
Induced impact	3.447	2.012	5.625	11.084

Figure 119. Seafood sector employment in FTE in 2006

162 Genome Canada (2013), *Canadian Fisheries & Aquaculture: How genomics can address sector challenges*, p9.

163 Genome Canada (2013), *Canadian Fisheries & Aquaculture: How genomics can address sector challenges*, p17.

164 Includes both marine fishing and inland fishing.

165 The study does not describe the exact number of activities included in the downstream activities.

166 The ancillary sector is defined as all upstream and downstream activities. Unfortunately, it is not explained whether this also includes downstream activities beyond the first point of sale.

167 Includes both marine fishing and inland fishing.

168 Fisheries and Oceans Canada (2006), *Economic Impact of Marine Related Activities in Canada*,.

Looking at ancillary activities that are organised around ports and companies in the fishing sector, most activity revolves around berthage, loading/offloading facilities, fish buying companies, cold storage, shipping, fresh water supplies, ship supplies, fuel, maintenance and repairs[169]. On some occasions, ports themselves also provide services to fishing companies. An example is the Port of Digby, which provides berthage and loading/unloading facilities for a fleet of 100 fishing vessels. The port also hosts independent fish buying and cold storage companies[170]. In general, processing is done locally, or around ports. With respect to aquaculture, ancillary activities are less clearly defined. In general, aquaculture ancillary services have an overlap with fishing when it comes to processing facilities, loading/offloading, buying, storage, shipping and other services. Ancillary services specifically geared towards aquaculture revolve around fish feed, specific aquaculture equipment such as nets and pens, and fish care.

GSGislason & Associates Ltd. explain in their study on trawl fishery in British Colombia that the total contribution of this fishery sector in the economy is around 69,5 million Euros in total income and 2.590 in employment (including direct, indirect and induced effects[171]) (see *Figure 120*). In the end, including the change in the primary sector, around 1,50 Euro is generated in the entire economy for each Euro generated in the primary industry, and 1,50 employee is generated in the economy for each employee in the primary sector[172,173]. In other words, 0,50 euro and 0,50 employees is generated in sector directly or indirectly related to trawl fishery in British Colombia in Canada.

	Direct	Indirect + Induced	Multipliers
Wages	€ 46,5 million	€ 23 million	~0,5
Employment	1.725	865	~0,5

Figure 120. Economic importance of trawl fishery in British Colombia

The study also explains the following[174]:

- Primary drivers for employment are crew and skipper payments, offloading, processing and trucking. Gear purchases, vessel repairs & maintenance and other supply sectors also contribute, albeit to a lesser extent.
- Overall average annual wage earned is around €27.000 in activities directly and indirectly related to trawl fishery in British Colombia; almost identical to the British Columbia average.
- Employment is mainly generated in processing activities.
- While overall economic importance of trawl fishery is low (0,1% of employment), dependence of this kind of fishing is significant is smaller coastal communities, where dependence in terms of employments can be as high as 2 to 12%.

Interesting findings with respect to the ancillary sector are also made looking at the expenses of aquaculture companies submitted at the Canadian Bureau of Statistics (see *Figure 121*)[175]. Although it constitutes a high level overview, it does show that most of resources is spent on product expenses, or supplies such as equipment and fish feed.

	2010	2011	2012	2013	2014
Gross output	1,030,826	907,155	870,235	1,012,250	915,65
Product expenses	646,924	643,775	670,845	625,015	671,39

169 Gardner Pinfold (2010), *Economic Impact Study of Independent Marine Ports in Atlantic Canada*, p31.

170 Gardner Pinfold (2010), *Economic Impact Study of Independent Marine Ports in Atlantic Canada*, p16.

171 Unfortunately, no definition of direct and indirect effects have been provided. However, it can be assumed that direct effects include both harvesting and processing, where indirect effects include all upstream and downstream activities that also go beyond the first point of sale.

172 GSGislason & Associates Ltd. (2010), *Economic Impacts from a Reduced Groundfish Trawl Fishery in British Columbia*, piii.

173 GSGislason & Associates Ltd. (2010), *Economic Impacts from a Reduced Groundfish Trawl Fishery in British Columbia*, p10.

174 GSGislason & Associates Ltd. (2010), *Economic Impacts from a Reduced Groundfish Trawl Fishery in British Columbia*, p10.

175 Statistics Canada (2015), *Aquaculture economic statistics, value added count*.

	2010	2011	2012	2013	2014
Change in inventory value, raw materials	-2,755	3,795	3,945	5,535	195
Total of product inputs	649,679	639,98	666,9	619,48	671,195
Gross value added (factor cost)	381,147	267,175	203,335	392,77	244,455
Salaries and wages	109,368	106,81	105,38	103,035	106,09
Employer portion of employee benefits	16,94	15,715	15,48	14,15	15,14
Depreciation	74,3	68,295	64,975	64,215	61,12
Interest paid	17,014	12,575	27,09	23,335	18,045

Figure 121. Expenditures of aquaculture companies in Canada in Canadian Dollars (2010 - 2014)

Looking at the relationship between the ancillary sector and the primary sector, fishing and aquaculture seem to be of small importance to ancillary service providers of more generic services, such as fuel, shipping, maintenance of ships, and other services. Most of these services are transferable to other industries, and in fact often supply other industries. Since the fishery and aquaculture sector only contributes 0,18% to Canada's GDP[176], the degree of dependence of most of the ancillary providers is expected to be limited. However, this is not necessarily the case for providers of more specific services, such as fish feed for aquaculture or specialised fishing equipment. Similarly, the processing sector is often more dependent on the primary fishing sector. Looking at the multipliers found, although a lot of different definitions have been used throughout studies, most multipliers seem to lie between 0,5 and 1,0, both related to income and related to employment looking at those multipliers that – at least – exclude induced effects.

In small coastal communities, particularly on the Atlantic coast, dependence on fishing is higher. For most of these small coastal communities fisheries are the only source of employment[177]. This can already be seen in the information on British Columbia above, where smaller coastal communities in more distant parts of British Columbia are dependent on fishery to a much larger degree compared to urban areas. It should further be noted that since fishing constitutes mostly seasonal employment in Canada, most fishermen in these small coastal communities benefit from the Canadian social welfare network for parts of the year[178]. A lot of fishery operations, such a processing plants, make fairly extensive use of labourers instead of mechanising their operations in order to be able to flexibly respond to changes in demand and account for the seasonality of the work. This flexibility has a downside in the sense that workers in the sector face a certain inherent uncertainty in employment. Especially in smaller coastal communities, where workers are dependent on fishery activities, this can lead to low resilience on the part of workers, who might otherwise have little in the way of education or other job prospects locally. The influence of this seasonal aspect on the ancillary sector has remained unclear, but it is expected that these services are also bound by the fishing season, at least to a degree.

VII.2 Analysis of activities ancillary to marine fishing and aquaculture in Iceland

Analysis on the primary sector

Historically, fishing is of significant importance in Iceland in terms of culture, but also in terms of employment. Fishermen have been fishing around Iceland for decades, but also in international waters and, per international agreement, in the Exclusive Economic Zone of Norway[179]. The fishing industry has faced uncertain times both economically and with regards to government policy, with fishermen complaining about the resource tax[180] instituted by the Icelandic government[181].

176 This was calculated using primary sector values only. When the related processing and ancillary sectors are considered this figure approximately doubles (not accounting for induced effects).

177 FAO (2013), *Role of fisheries in the national economy*,

178 FAO (2013), *Role of fisheries in the national economy*.

179 Exclusive Economic Zone is the area 200 nautical miles from the coast of a country (source: United Nations (2015), Exclusive Economic Zone, https://www.un.org/depts/los/convention_agreements/texts/unclos/part5.htm).

180 Vessel owners have to pay a license fee for every kilo of quota allotted to them and that applies to all species. For a kilo of cod quota, for example, the tax is €0.08, for haddock €0.10, for herring €0.06 and for a kilo of mackerel quota the fee is €0.05.

Iceland's total catch (measured as national landings in domestic ports) was 1.367 thousand tonnes in 2013[182]. This amount fluctuates yearly and has been showing a decreasing trend in the past few years[183]. The reason for this decrease is not precisely known, but lower quota's have most likely played a role. According to Statistics Iceland, catch rates were 1.076 thousand tonnes in 2014 (1.362 thousand tonnes in 2013), generating €1,08 billion in 2014 ((€0,97[184] billion in 2013)[185].

Cod is the most important fish species in Iceland when looking at export value, where virtually all of fish produced in Iceland is exported[186]. The utilisation of cod catch has increased dramatically due to increased utilisation of cod by-products such as heads, liver and roe[187,188]. In 1981, cod catch was 460.000 tonnes worth 319 million Euros[189] versus 180.000 tonnes worth 637 million Euros in 2011[190]. Although it is hard to determine, this decline may have been affected or influenced by the introduction of a quota system in 1990[191]. The Iceland Ocean Cluster explains that this increase in export value is mainly due to the modernisation of the fishing industry, focusing on increased utilisation of catch and advanced products, such as fish liver oil[192]. Margins in the fishing industry were around 23% in 2013[193,194].

According to Islandsbanki – one of Iceland's primary banks – fishing was responsible for 6,3% of Iceland's GDP in 2013, with processing contributing an additional 3,7% to GDP[195]. Furthermore, the average contribution to GDP of the seafood sector – fishing and processing – over the last 10 years (2003-2013) was 8,5%[196] (see *Figure 122*). Differences in the contribution of fishing to the Icelandic GPD can mainly be attributed to fluctuating economic circumstances[197].

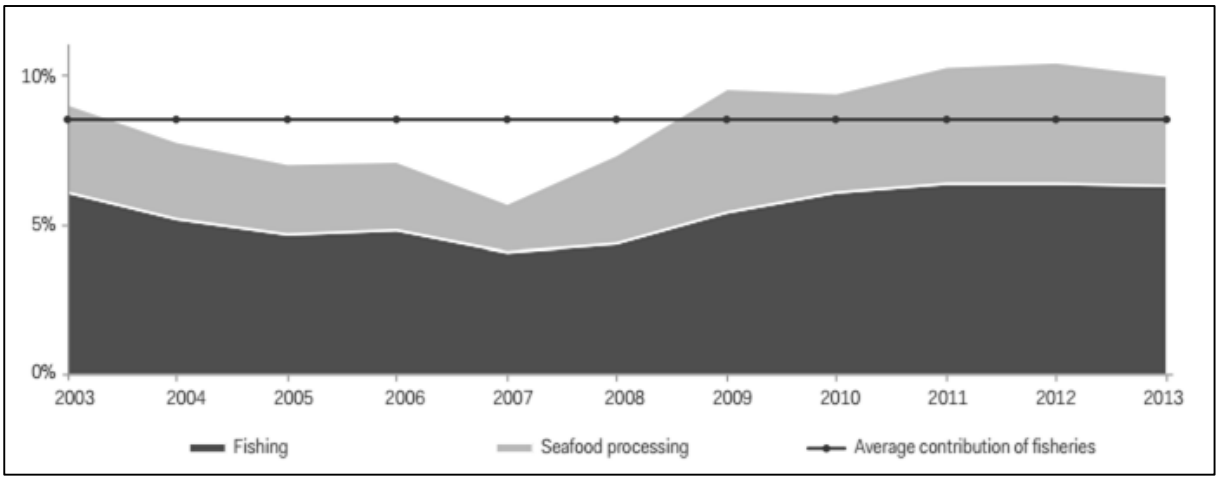

Figure 122. The fishing sector in relation to GDP

Employment related to the fishing industry is presented in *Figure 123*. What becomes clear from *Figure 123*, is that the fisheries sector is quite important for Iceland where employment is concerned; around 5% of

181 Worldfishing (2014), *Cautious optimism in Icelandic fisheries*, http://www.worldfishing.net/news101/regional-focus/cautious-optimism-in-icelandic-fisheries.

182 OECD.Stat (2015), *National landings in domestic ports*, http://stats.oecd.org/Index.aspx?DataSetCode=FISH_NLD#.

183 Islandsbanki (2014), *Icelandic Seafood Market Report*, p8.

184 At an exchange rate of 140,4 ISK for 1 EUR.

185 Statistics Iceland, *Catch and catch value by fishing area and species 1993-2014*.

186 FAO (2010), *Fishery and Aquaculture Country Profiles – The Republic of Iceland.*

187 Iceland Ocean Cluster (2013), *Ocean Cluster Analysis: Twice the value for 40% of the catch*, p1.

188 Islandsbanki (2014), *Icelandic Seafood Market Report*, p24.

189 340 million US dollars, as stated in the report, or 319 million Euros at an exchange rate of 1 Euro = 1,06 US Dollars.

190 Iceland Ocean Cluster (2013), *Ocean Cluster Analysis: Twice the value for 40% of the catch*, p1.

191 FAO (2010), *Fishery and Aquaculture Country Profiles – The Republic of Iceland.*

192 Iceland Ocean Cluster (2013), *Ocean Cluster Analysis: Twice the value for 40% of the catch*, p1.

193 Islandsbanki (2014), *Icelandic Seafood Market Report*, p8.

194 It is unclear to what extent processing is taken into account in this figure.

195 Islandsbanki (2014), *Icelandic Seafood Market Report*, p5.

196 Islandsbanki (2014), *Icelandic Seafood Market Report*, p5.

197 Islandsbanki (2014), *Icelandic Seafood Market Report*, p5.

Iceland's workforce is employed in the fisheries industry, amounting to around 3.600 people in the fishing sector (and 5.000 in the processing sector). Looking at other OECD countries, this is an above average number[198].

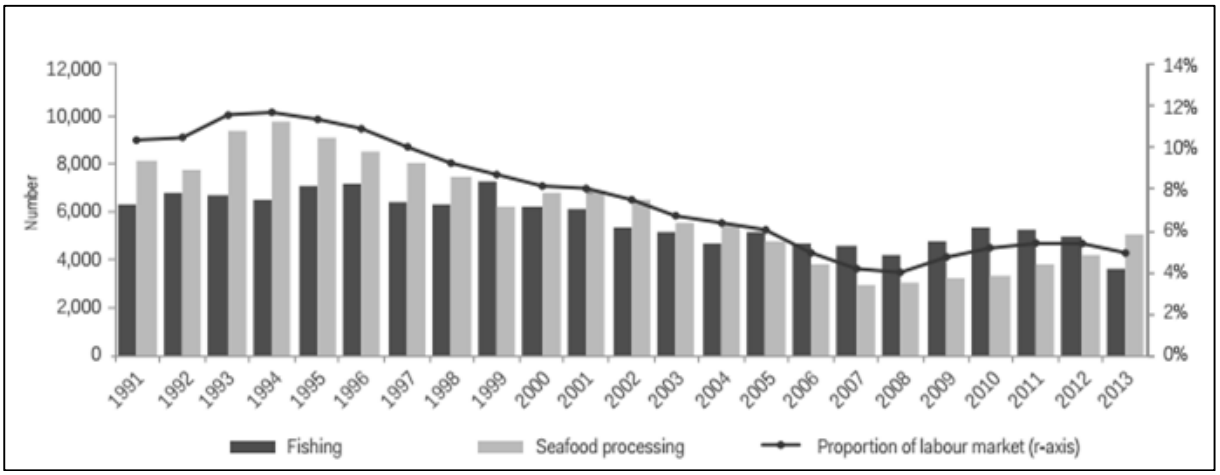

Figure 123. Employees in the fishing sector

Around 33% of all workers employed in the fisheries industry is female (around 2.800 people), with 87% of those female employees working in the processing sector (around 2.400 in 2013). The fisheries industry is mostly (81%) located outside of the greater Reykjavik area (highlighted in *Figure 124*), the largest urban area in Iceland. In the end, the fisheries industry accounts for 11% of all jobs outside of the greater Reykjavik area[199].

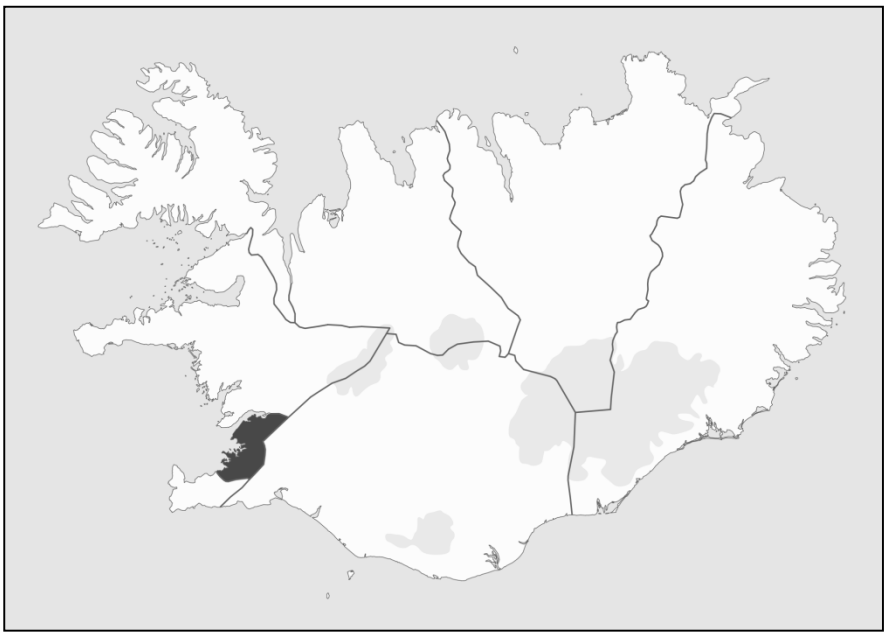

Figure 124. Greater Reykjavik area in Iceland

Looking at aquaculture in Iceland, this is much less significant. Aquaculture production was around 6.000 tonnes in 2010 at a value of €21,4 million[200]; i.e. less than 1% in terms of volume and less than 3% in terms of value looking at the overall production in the fishing industry in Iceland[201]. As for the number of

198 Islandsbanki (2014), *Icelandic Seafood Market Report*, p6.

199 Islandsbanki (2014), *Icelandic Seafood Market Report*, p6.

200 Iceland Ocean Cluster and Islandsbanki (2011), *The Importance of the Ocean Cluster for the Icelandic Economy*, p16.

201 Calculated from Statistics Iceland, *Catch and catch value by fishing area and species 1993-2014* and Iceland Ocean Cluster and Islandsbanki (2011), *The Importance of the Ocean Cluster for the Icelandic Economy*, p16.

aquaculture farms, Icelandic Fisheries explains that there were 50 registered fish farms in 2008, of which around 19 are focused on R&D in aquaculture as to develop new techniques to culture fish[202].

Analysis on the ancillary sector and its relationship with the primary sector

The Iceland Ocean Cluster and the Islandsbanki explain that the fisheries industry is a primary industry, which is to say that it is disproportionally important to other industries. In other words, the fisheries industry is very important to a number of other industries, but those other industries are not as important as the fisheries industry itself[203]. A number of ancillary activities are explained to be closely supporting the primary fisheries industry and processing activities. These ancillary services/activities are[204]:

- Packaging;
- Shipping;
- Mechanical manufacturing;
- Fishing gear manufacturing;
- Metal industry;
- Public administration.

Other services/activities which are more loosely connected to the fisheries industry are transport, commission trading and power utilities[205]. The ancillary services that are closely connected to the fisheries industry have emerged in the wake of significant growth (value-wise) in, and demand from, the fisheries industry. The demand could have been satisfied by foreign companies located outside Iceland, but it has instead mostly been fulfilled locally due to local initiatives and production capacity in Iceland[206].

Looking at employment, it is estimated that around 25.000 to 35.000 jobs are created directly and indirectly by the fisheries industry in Iceland. Taking into account that the indirect contribution to the Icelandic economy was 7,3% in 2010 and the total contribution to the economy was 24,5% taking into account direct, indirect and induced effects, total employment generated by ancillary companies in Iceland is estimated at ~7.225 jobs, or 29%[207] of 25.000 jobs.

The ancillary sector provides services to both processing and the primary sector, where in total, 8.600 people are employed (5.000 in processing and 3.600 in the primary sector). Hence, the estimated number of employees in the ancillary sector per employee in the primary sector is ~0,84[208]. Unfortunately, jobs cannot be attributed to either processing or the primary sector and thus more specific estimates cannot be provided. Please note that the number of jobs presented is not in FTE. In other words, the number of FTE in the ancillary sector is most likely lower than 7.225 jobs and thus the dependency is too.

In conclusion, the dependency in Iceland with respect to the fishing industry is high; in the ancillary sector as well as the entire Iceland economy taking also into account the induced effects. Overall, companies are unlikely to be resilient to disruptions in the primary fishing industry. A significant negative change in the primary industry is likely to become debilitating to most companies' survival and to the Icelandic economy. In general, the more specialised or focused a service is, the less resilient it is. In addition, the higher the dependence is on the fishing industry with respect to the economy, the less resilient these companies are, due to less alternative sources and industries to generate income from, which seems to be the case for Iceland.

202 Icelandic Fisheries (2015), *Aquaculture*, http://www.fisheries.is/aquaculture/.

203 Iceland Ocean Cluster and Islandsbanki (2011), *The Importance of the Ocean Cluster for the Icelandic Economy*, p5.

204 Please note that the ancillary activities listed here are less than the ancillary activities taken into account for the European desk research and case studies conducted during this study.

205 Iceland Ocean Cluster and Islandsbanki (2011), *The Importance of the Ocean Cluster for the Icelandic Economy*, p6.

206 Iceland Ocean Cluster and Islandsbanki (2011), *The Importance of the Ocean Cluster for the Icelandic Economy*, p7.

207 7,3% (indirect contribution) divided by 25,2% (total contribution), or ~29%.

208 7.225 divided by 8.600 = 0.84.

VII.3 Analysis of activities ancillary to marine fishing and aquaculture in Japan

Analysis on the primary sector[209]

The Japanese have a long standing fishery tradition. Historically, this is due to plentiful access to waters rich with marine life. Japan's culinary tradition has evolved around the easily accessible fisheries resulting in a large number of fish products being used for nourishment.

In the past few decades Japan's fisheries have been affected by a number of challenges, some quite recent. The aging fishing workforce has been affecting the total production of fish for the last two to three decades, showing a downward trend in the amount of fish harvested[210]. The decrease of fishing opportunities has also contributed to that trend, where the Ministry of Fishing, Forestry and Agriculture explains that the fish stocks in Japanese fishing areas are low[211]. More recently, the earthquake and resulting tsunami that hit Japan in 2011, have damaged fisheries, the fishing fleet and hence the productivity of the sector as a whole. The subsequent meltdown of a number of reactors in Fukushima's nuclear plant has affected fishing opportunities in the region, with 40% of fish caught still containing unsafe levels of radiation four years later[212]. All in all, the recent disasters have amounted to about 28.500 fishing vessels, 319 ports and 1.725 communal facilities damaged for a total amount of €9,6[213] billion in damages[214].

In the primary fishing sector, production volumes, number of vessels, and employment in marine fishing have all seen declines. *Figure 125* shows the differences between the years 2000 and 2010 in terms of volume, income, number of vessels, and employment.[215] This decreasing trend has also continued after they year 2000, where in 2014 only 173.000 were employed in the primary fishing sector. Nevertheless, the OECD explains that about 200.000 households (with 730.000 people) are dependent on the primary sector as a direct source of income[216, 217].

	2000	2010	Difference (%)
Volume	~6,2 million tonnes	~5,2 million tonnes	- 19%
Income	€13.3 billion	€11.4 billion	- 17%
# Vessels	361.960	276.074	- 24%
Employment	277.042[218]	211.810[219]	- 24%

Figure 125. The Japanese fishing industry

Though the fishing industry is not important for the Japanese economy as a whole – considering that it contributed about 0.2% to the national GDP in 2009[220] – it is important for coastal communities, which depend on the fishing sector in terms of employment and income[221]. Furthermore, fishing is of cultural significance in Japan, considering that seafood is a highly regarded food source for the Japanese[222]; Japanese get about 23% of their required protein intake from fish products, compared to about 8% in case of Americans[223].

209 Please note that most reports were in Japanese, limiting the range of studies that were available for analysis.

210 Scientific American (2013), *Challenges Facing Japan's Marine Fisheries*.

211 Japanese Statistics Bureau (2015), *Statistical Handbook of Japan 2015*, Chapter 5, section 4 (fisheries).

212 Scientific American (2013), *Challenges Facing Japan's Marine Fisheries*.

213 All amounts in € in this analysis were calculated from Japanese Yen at an exchange rate of 0.0076109818 EUR to 1 JPY.

214 Japanese Ministry of Agriculture, Forestry and Fisheries (2012), *Annual Report 2012 – Trends in Fisheries*, p13.

215 Calculated using data from EU Parliament Policy Department B – Structural and Cohesion Policies (2013), *Fisheries in Japan*.

216 OECD, *Fisheries and Japan: A Case of multiple roles?*, p3.

217 This study does not provide FTE's or the number of people employed from those households, limiting the scope of these numbers to a general indication for dependence on the fishery sector as a direct source of income.

218 Figures for 2000 were unavailable, this figure is for 1998.

219 Figures for 2010 were unavailable, this figure is for 2009.

220 EU Parliament Policy Department B – Structural and Cohesion Policies (2013), *Fisheries in Japan*, p13.

221 OECD, *Fisheries and Japan: A Case of multiple roles?*, p1.

222 Ibid, p1.

223 Scientific American (2013), *Challenges Facing Japan's Marine Fisheries*.

In 2014, Japan produced about 4.800.000 tonnes of fish, of which approximately 20% came from aquaculture (both inland and marine), and of which approximately 80% came from marine fishing[224]. Looking at 2010, Japan produced about 5.200.000 tonnes of fish, which generated €11,4 billion for the Japanese fisheries sector, €8 billion of which was attributable to marine fishing and €3,4 billion of which was attributable to aquaculture[225]. In summary, it can be concluded that aquaculture is somewhat more profitable on average per ton of fish produced than marine fishing, given that aquaculture generates 30% of the total value of Japanese fisheries with only 21% in volume[226].

Looking at the fishing supply chain, the majority of fish products for domestic human consumption[227] (~60%) is shipped to processors, while the remainder is shipped directly to for instance wholesalers. Processing plants are almost all located in coastal regions and communities (90%)[228]. As a result, the fishery-processing industry is a core industry for local fishing communities, where labour is mostly sourced locally[229]. After production/landing and processing, most fish products are distributed to wholesalers, with transport in between and a retailer who sells the goods to consumers[230].

Please note that Japan compensates for dropping domestic fishery production by importing fishery products from around the world. Currently Japan imports about half of its consumed fishery products to satisfy demand, measuring its self-sufficiency rate at 58%[231]. Because of this, the impact of declining production in the primary fishing industry is mitigated for wholesalers, retailers and to a degree distributors, since these are also involved in the supply chain and sale of imported fish products.

The ancillary sector and its relationship to the primary sector

The OECD explains that about 210.000 people in the processing sector were dependent upon the fishing industry – fishing and aquaculture – as a direct source of income in Japan in 1998[232]. Another 0,5 to 1 million people were estimated to be a part of the ancillary sector – with activities such as transport, distribution, wholesale, retail, and supply industries – and are dependent upon the primary fishing and secondary (processing) sectors as a source of income[233,234].

The Japanese Ministry of Agriculture, Forestry and Fisheries explains that around 315.000 people were engaged in marine-fishery related activities on land in 2008[235,236]. Furthermore, the primary sector employed around 220.000 workers and another 215.000 workers were employed in processing in 2008; i.e. when looking at the relationship between direct fishery activities and the processing sector, the processing sector employs slightly less than 1 FTE per FTE in the fishing industry[237]. When looking at the relationship between the primary sector and ancillary sector, a multiplier of 1,43 is found, based on the information above[238]. Please that the exact definition of "on land" is not explained and activities beyond the first point of sale have been included[239].

224 Japanese Statistics Bureau (2015), *Statistical Handbook of Japan 2015*, Chapter 5, section 4 (fisheries).

225 EU Parliament Policy Department B – Structural and Cohesion Policies (2013), *Fisheries in Japan*, p29, 34.

226 EU Parliament Policy Department B – Structural and Cohesion Policies (2013), *Fisheries in Japan*, p29, 34.

227 Non-human use is as animal feed and other purposes. It accounted for 2.265 thousand tonnes in 2005, versus 7.830 thousand tonnes for human consumption in 2005. These figures include domestic production and import. The figures were sourced from: FAO (2009), *National Fishery Sector Overview – Japan 2005*.

228 Japanese Minstry of Agriculture, Forestry and Fisheries (2012), *Annual Report 2012 – Trends in Fisheries*, p24-25.

229 OECD, *Fisheries and Japan: A Case of multiple roles?*, p1-5.

230 Japanese Minstry of Agriculture, Forestry and Fisheries (2012), *Annual Report 2012 – Trends in Fisheries*, p25.

231 Japanese Minstry of Agriculture, Forestry and Fisheries (2012), *Annual Report 2012 – Trends in Fisheries*, p20.

232 OECD, *Fisheries and Japan: A Case of multiple roles?*, p3.

233 OECD, *Fisheries and Japan: A Case of multiple roles?*, p4.

234 Please note that the number of activities included go beyond the first point of sale.

235 Japanese Ministry of Agriculture, Forestry and Fisheries (2012), *Annual Report 2012 – Trends in Fisheries*, p22.

236 Unfortunately, no exact definition of "on land" activities is provided.

237 This information was calculated using data from the *Annual Report 2012 – Trends in Fisheries*. 215.000 workers in the primary sector, divided by 220.000 workers in the processing sector yields a multiplier of 0,98.

238 Calculated as 315.000 workers engaged in marine-fishery related work on land, divided by 220.000 workers in the primary fishing industry, arriving at a multiplier of 1,43.

239 OECD, *Fisheries and Japan: A Case of multiple roles?*, p1-5.

The dependency on the primary fishery activities differs per sector. For processing activities this degree of dependence is high, since their input relies on the production of fish in the primary sector. Unfortunately, looking specifically at ancillary activities it is more difficult to estimate, considering the paucity of available data on the ancillary sector[240]. Nevertheless taking into account the fact that Japan has a fair number of coastal communities that revolve around fishing, most ancillary activities in those coastal communities will be quite susceptible to fluctuations in the primary fishing sector; as was also proved looking at the effects of the tsunami and the Fukushima disaster[241].

VII.4 Analysis of activities ancillary to marine fishing and aquaculture in New Zealand

Analysis on the primary sector

New Zealand's primary fisheries sector has been increasing over the last 30 years, where the introduction of the Exclusive Economic Zones in 1982 has contributed significantly to the fishing; the Exclusive Economic zone established a 200 nautical mile perimeter for New Zealand waters in which only fishing vessels registered in New Zealand are allowed to fish. This prohibited other countries from fishing the waters around New Zealand and allowed New Zealand's fishermen to expand their fishing practices significantly.

In 1986, the Quota Management System (QMS) was also introduced, limiting the total allowed catch of certain species of fish[242]. Over time, the QMS has expanded to cover a wide range of fish species, governing most fishing activities in New Zealand and its territorial waters. In fact, fish species are added to the QMS regularly, becoming subject to the QMS's quota's and regulations. Although the QMS limits the amount of fish, New Zealand's production of fish has risen in a relatively sustainable way over the years, though there is still a decline in some of New Zealand's fishing opportunities[243].

New Zealand has traditionally been populated by Maori people. The Maori population has a long history in fishing and it is a significant part of their culture. Therefore, Maori population receives a fixed 20% of quota of each fish species in the QMS, accommodating their cultural connection with, and their dependence on, fisheries. In other words, the Maori population is allowed to catch 20% of the quota of each species or they can choose to sell their quota rights to other fishermen. For international fishermen, the purchase of quota rights is the only way to fish within the Exclusive Economic Zone of New Zealand and therefore, selling quota rights can be a lucrative business.

Due to the establishment of Exclusive Economic Zones, the fishery industry in New Zealand has grown from being a predominantly domestic supplier to one of New Zealand's leading export industries[244]. The fishing industry in New Zealand is very concentrated, with only eight fishing companies providing 80% of production, where the other 20% is produced by a large number of medium and small-sized businesses.

Currently, New Zealand's fish production contributes ~1% to global fish production. Furthermore, New Zealand's fisheries are responsible for about 0,7% of New Zealand's GDP. New Zealand's fish exports contributed €865[245] million in earnings over the year 2009, compared to €819 million for the year 2000; a 6% increase for both aquaculture and fishing[246,247]. Looking at employment, around 7.000 people work in marine fishing and aquaculture in New Zealand, or 1% of the total workforce, of which about 3.000 people work in aquaculture and 4.000 people work in marine fishing[248]. Employment has remained roughly the same over the last 5 to 10 years. The workforce in the fishing industry is predominantly male (80%), compared to 53% in the total workforce in New Zealand. Additionally, the sector employs twice as many

240 Much of the data is in Japanese, limiting usable data.

241 Japanese Minstry of Agriculture, Forestry and Fisheries (2012), *Annual Report 2012 – Trends in Fisheries*, p13-18.

242 New Zealand Ministry for Primary Industries, *Quota Management System,* http://fs.fish.govt.nz/Page.aspx?pk=81.

243 New Zealand Ministry for Primary Industries (2011), *The status of New Zealand's fisheries 2011*.

244 New Zealand Ministry for Primary Industries, *Commercial Operators*, http://fs.fish.govt.nz/Page.aspx?pk=130.

245 All financial figures are in €'s, calculated from New Zealand $'s at an exchange rate of $1 to €0,60.

246 Wellington, Statistics New Zealand (2010), *Fish Monetary Stock Account: 1996 – 2009*.

247 Aquaculture New Zealand (2012), *New Zealand Aquaculture: A sector overview with key facts, statistics and trends*, p6.

248 Maritime New Zealand (2011), *Fishing Sector Action Plan to 2015*, p5.

Maori workers as any other industry in New Zealand[249]. Maori coastal communities rely on fisheries for their livelihood from a historical perspective, and will continue to rely on this industry for decades to come.

Looking specifically at aquaculture in New Zealand, the aquaculture industry generated over €240 million in 2011[250], where the industry have set itself a target of €600 million in 2025. The primary aquaculture species farmed in New Zealand are Greenshell mussels (101.311 tonnes in 2011), King Salmon (14.037 tonnes in 2011) and Pacific Oysters (1.804 tonnes in 2011). As of December 2011, aquaculture activities in New Zealand takes place within approximately 19.268ha of allocated water space. Of this[251]:

- 7.743 ha is granted to the aquaculture industry with the right to farm for a defined term, and is in known productive growing areas.
- 8.960 ha are open-ocean sites where productivity is yet to be proven.
- 1.195 ha are near shore sites yet to be developed.
- 1.370 ha is undeveloped space in interim AMA's[252].

The major aquaculture areas in New Zealand are shown in *Figure 126*.

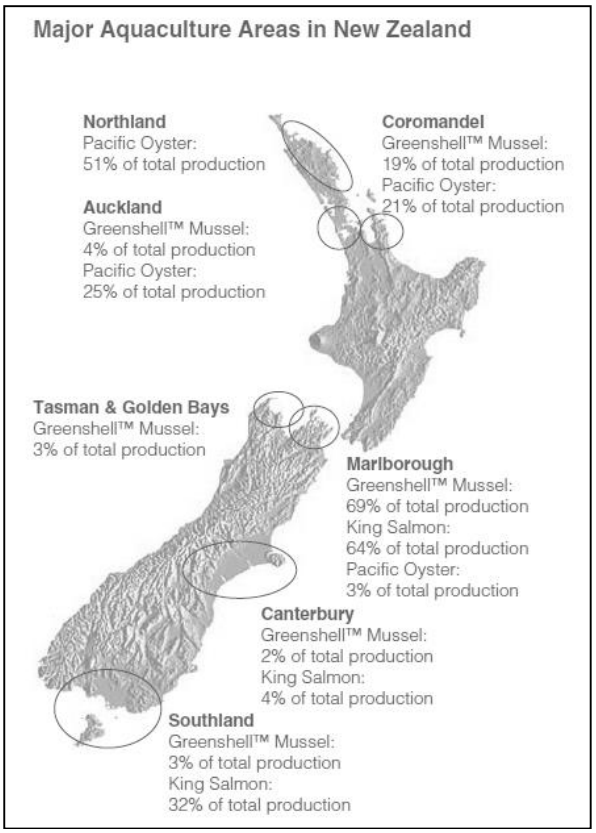

Figure 126. Major aquaculture areas in New Zealand

In conclusion, New Zealand has a slowly growing and relatively sustainable fishing and aquaculture industry. The total value of catch in the QMS (i.e., more or less the total value of New Zealand's fish stock), has risen steadily over the last decades from €1,6 billion in 1996 to €2,4 billion in 2009[253]. This development can be best explained in two ways; on the one hand new species have been introduced in the QMS in the period from 1996 to 2009 (i.e. total value of catch has not risen, but was just not included in the QMS) and on the other hand – as the Ministry of Primary Resources explains – the relatively sustainable exploitation of New

249 Ibid, p5.

250 Aquaculture New Zealand (2012), *New Zealand Aquaculture: A sector overview with key facts, statistics and trends*, p2.

251 Aquaculture New Zealand (2012), *New Zealand Aquaculture: A sector overview with key facts, statistics and trends*, p6.

252 AMA stands for Aquaculture Management Area.

253 Wellington, Statistics New Zealand (2010), *Fish Monetary Stock Account: 1996-2009*, p4.

Zealand's fish stock, leading to higher quota's for some species. This last observation is strengthened by the fact that quotas are not filled each year. This presumably means that quotas are more than enough to fulfil domestic and foreign demand for fish from New Zealand. Overall, this reduces the risk on depletion of resources[254]. Where aquaculture is concerned, the production and export values have risen year over year from 1993 onwards[255].

Analysis on the ancillary sector and relationship with the primary sector

Looking at the ancillary sector in New Zealand, few studies have been performed to gauge the overall size of this sector. The involvement of the Maori population also makes it more difficult to measure ancillary activities, since their fishing activities are traditional and often organised locally with the active participation of local communities without formally organising these activities.

Nevertheless, one study performed in the Hauraki Gulf region – one of the biggest fishing regions in New Zealand with ~30% of all maritime activity and almost 50% of species caught[256] – provides qualitative and quantitative insight into the ancillary industry in New Zealand[257] (see *Figure 127*). Looking at aquaculture, the study reveals that 187 FTE are employed in farming, where 705 FTE are active in processing and 408 FTE are employed in activities ancillary to fishing and processing combined, i.e. per FTE employed in the primary sector and processing 0,46 FTE is employed in the sector ancillary to processing and aquaculture. These activities mainly comprise of maintenance activities and the provision of supplies for the operation.

Figure 127. Hauraki Gulf in New Zealand

What is more, the Auckland Council provides data on specific regions in the Hauraki Gulf with respect to the sector ancillary and complementary to fishing and aquaculture, which is presented in *Figure 128*.

Region	Sector	Employment	Multiplier
Auckland	Aquaculture	66 FTE are directly employed in the primary sector, against 37 FTE in the ancillary sector	0,56 FTE is employed in the ancillary sector, per FTE employed in the primary sector
Waikato	Aquaculture	121,1 FTE are directly employed in the primary sector, against 117,7 FTE in the primary sector	0,97 FTE is employed in the ancillary sector, per FTE employed in the primary sector

Figure 128. Ancillary employment in the Hauraki Gulf in 2012

254 Ibid.

255 Aquaculture New Zealand (2012), *New Zealand Aquaculture: A sector overview with key facts, statistics and trends*.

256 Infometrics (2014), *Maritime Sector Profile 2014*.

257 Auckland Council (2012), *Towards an Economic Valuation of the Hauraki Gulf: A Stock-take of Activities and Opportunities*, Technical Report 2012/035, p61-90.

What can be concluded from *Figure 128* is that multipliers in the aquaculture sector seem to lie somewhere between 0,5 and 1,0 FTE per FTE employed in the primary sector, where the multiplier looking at the entire Hauraki Gulf is 0,46, taking into account both employment in the primary sector and employment in processing.

Unfortunately, no such figures were provided for marine fishing in the Hauraki Gulf, other than that around 1.183 FTE is employed in the primary sector.

The Thames Coromandel District Council performed similar research on the aquaculture sector in the Coromandel region in New Zealand[258]. The Coromandel region is mainly focused on bivalve aquaculture, with an overall production of 31.000 tonnes of mussels and 400 tonnes of oysters, contributing 46,2 million Euros to New Zealand's GDP. The Thames Coromandel District Council found that direct regional employment is equal to 297 people in 2014; 121 people in farming and 176 people in processing. Furthermore, they explain that the aquaculture sector in this region generated about 432 jobs taking into account both indirect and induced effects. Hence, for each job in the primary sector in aquaculture, 3,6 jobs are being created in the entire economy in the Coromandel region. Finally, contribution to household income (i.e. wages) is estimated on 3,6 million Euros in the entire economy, thus taking into account indirect and induced effects[259].

Overall, the importance of the fishing industry in New Zealand, including processing and the sector ancillary to fishing, seems limited. Clearly, a number of people depend on the sector, but compared the the overall regional, and New Zealand economy, this number is relatively small (the Hauraki Gulf region employs around 670.000 people). It is difficult to estimate the exact degree of dependence of the ancillary sector on the primary sector due to the paucity of available data. In literature it is emphasised that the processing sector is highly dependent on the primary fisheries and aquaculture sectors. This means that the processing sector is not very resilient in the face of disturbances in the primary sector, which makes sense in light of the specialised nature of the work. Looking specifically at a region such as the Hauraki Gulf – where Auckland supports around 33% of New Zealand's entire economy – numerous other opportunities in other industries are being offered for a number of ancillary service providers. Consequently, most companies in the ancillary sector in the Hauraki Gulf region are likely to be quite resilient in the face of disturbances in the primary sector as they are expected to service multiple industries. Notwithstanding, it must be noted that this does depend on the type of service offered; when services that cannot be transferred to other industries such as the provision of feed, such services will be highly depended on the primary fishing industry.

What must be noted is that for Maori coastal communities the ancillary sector is expected to be more dependent upon the primary sector, considering that 27% of all Maori activities involve fishing activity of some sort[260]. Moreover, given the fact that ancillary services are mostly provided within the local community of the Maori, dependence can be quite significant.

VII.5 Analysis of activities ancillary to marine fishing and aquaculture in Norway

Analysis on the primary sector

Fishing has been a major industry in Norway throughout history and Norway's coastline and resources are well suited for the execution of fishing activity. While in the 1930s the contribution of the fishing industry to the national economy was 5,7%, in 2002 this was only 0,7%, indicating that the fishing industry's economic importance has declined significant in the past decades[261].

In Norway, 2,3 million tonnes of fish were caught in 2014, mainly cod and herring[262]. This is a 10,7% increase from 2013, but an 8,8% decrease from 2009[263]. The value of landings was €1,56 billion in 2014[264].

258 Thames Coromandel District Council (2015), *Economic impact of aquaculture*, http://www.tcdc.govt.nz/business/Aquaculture/Economic-impact-of-aquaculture/.

259 Thames Coromandel District Council (2015), *Economic impact of aquaculture*, http://www.tcdc.govt.nz/business/Aquaculture/Economic-impact-of-aquaculture/.

260 Ibidem, p6.

261 Norwegian Ministry of Fisheries and Coastal Affairs (2013), *Facts about Fisheries and Aquaculture 2013*, p5.

262 OECD, *Country note on national fisheries management systems – Norway*.

263 Norwegian Bureau of Statistics (2015), http://ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/fiskeri.

264 For an exchange rate of about 9,24 Norwegian Kroner for 1 Euro.

Compared to 2009, this is a 25,2% increase in value; i.e. the average value of catch has increased significantly in the past few years. This is explained by a decrease in Herring tonnage and an increase in Cod and Mackerel, which have a higher value to weight ratio[265].

Looking at aquaculture, 1,3 million tonnes of fish was produced in 2014, of which 94,5% was salmon[266]; a 6,8% increase of fish produced over 2013. The value of the aquaculture production over 2014 was €4,8 billion; a 9,5% increase over 2013[267]. The increase is mainly explained by increasing prices due to higher quality products and favourable market conditions and increasing production capacity of aquaculture farms[268].

An important threat for salmon farming in the aquaculture industry is the existence of sea lice. Sea lice exists in natural waters throughout the northern hemisphere, where these sea lice can result in higher mortality rates for salmon. Over the past few years, the level of sea lice at salmon aquaculture farms has risen. While medication is available, aquaculture farms try to innovate to combat the sea lice. Currently, farms largely solve the problem by deploying 'cleaner fish' in the aquaculture farms, whom are natural predators of sea lice[269].

Considering employment in the aquaculture sector, 5.759 workers[270] were involved in the production in 2014, against 3.129 workers in 2004; an increase of 84%[271]. Looking at marine fishing, employment rates are not collected on a structural basis by the Norwegian Bureau of Statistics[272]. Nevertheless, the fishing and aquaculture sector combined is explained to provide jobs to about 15.455 people in 2014[273]. Hence, the fishing sector is estimated to employ approximately 9.696 people (15.455 minus 5.759) in 2014, against 13.913 fishermen in 2002. Unfortunately, this decrease has not been explained, but similar trends have been observed in other OECD country analyses due to decreasing quota and the decommissioning of vessels[274].

Analysis on the ancillary sector and relationship with the primary sector

According to the Norwegian Seafood Federation, the fisheries value chain, which includes the catch, processing, export/trade and suppliers of services and equipment for the value chain, employed 24.200 FTE's, and generated 2,2 billion Euros in 2010[275]. Looking at aquaculture, the value chain was estimated to employ 21.100 FTE's and generate 2,9 billion Euros in 2010[276]. Overall, the fishing industry was estimated to employ 45.300 and generate 5.1 billion Euros in 2010, of which a breakdown is provided in *Figure 129*.

265 Norwegian Bureau of Statistics (2015), http://ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/fiskeri.

266 Norwegian Bureau of Statistics (2015), http://ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/fiskeoppdrett.

267 Norwegian Bureau of Statistics (2015), http://ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/fiskeoppdrett.

268 DKNVS, NTVA, *Value created from productive oceans in 2050*, p23.

269 FHL (2013), *Environmental Report 2012: Norwegian Seafood Industry – Emphasizing facts and figures from 2012 up to July 2013*, p68.

270 Workers and employment are not in FTE and are defined as those whose sole occupation was in either aquaculture or fishing.

271 Norwegian Bureau of Statistics (2015), http://ssb.no/en/jord-skog-jakt-og-fiskeri/statistikker/fiskeoppdrett/aar/2015-10-29?fane=tabell&sort=nummer&tabell=244031.

272 The distinction between marine fishing and inland fishing is appears to be unclear.

273 Norwegian Bureau of Statistics (2015), http://ssb.no/en/arbeid-og-lonn/statistikker/regsys/aar/2015-06-12?fane=tabell&sort=nummer&tabell=229567.

274 Norwegian Ministry of Fisheries and Coastal Affairs (2013), *Facts about Fisheries and Aquaculture 2013*, p9.

275 FHL (2013), *Environmental Report 2012: Norwegian Seafood Industry – Emphasizing facts and figures from 2012 up to July 2013*, p12.

276 FHL (2013), *Environmental Report 2012: Norwegian Seafood Industry – Emphasizing facts and figures from 2012 up to July 2013*, p12.

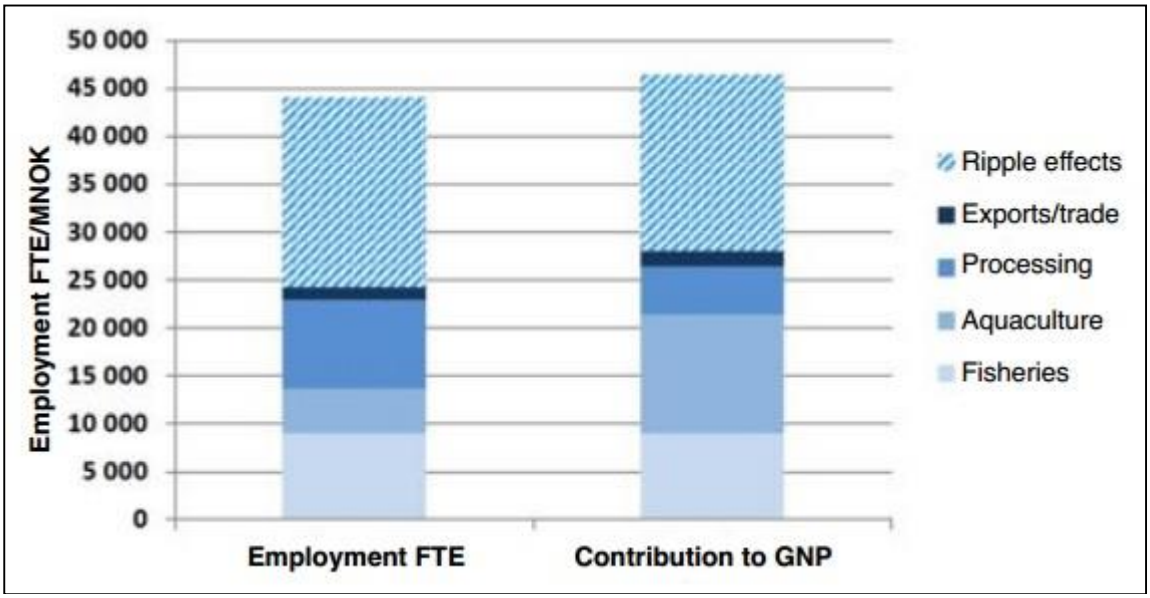

Figure 129. Employment in the value chain of the fishing industry in Norway in 2010

Looking specifically at multipliers in marine fishing, the FHL explains that 0,6 FTE is generated in the ancillary sector for each FTE in the primary sector. In aquaculture, this multiplier is estimated at 1,4 FTE per FTE employed in the primary sector. Furthermore, in aquaculture, each Euro generated in the primary sector is estimated to generate 0,8 Euros in the ancillary sector[277]. Unfortunately, the study fails to explain which activities have been included in the ancillary sector as such.

SINTEF – a research company – also performed research on the aquaculture and marine fishing sector in Norway in 2004 and found the following[278]:

- 48.000 FTE was employment in the fishing industry, including 25.000 FTE in the core activities and 23.000 FTE in other industries.
- €9,3 billion in income was generated, including €5,4 billion in the core activities and €3,9 billion in other industries.

In conclusion, in 2004, per FTE employed in the core activities of the fishing industry – aquaculture and marine fishing – 0,93 FTE is employed in other industries. Furthermore, per Euro generated in the core activities 0,72 Euro is generated in other industries. What must be noted is that "core activities" are defined as the combination of marine fishing, aquaculture, processing and wholesale[279], and other industries includes indirect effects as well as induced effects.

A case study in Troms County in Northern Norway, concluded that production companies purchased 80% of all the services they need from companies located in Norway[280]. Another case study specifically on an aquaculture farm, showed that companies active in the primary sector also provide several ancillary services themselves. Overall, it was estimated that only a small part of its total activity (14 FTE out of 53 FTE) was related to the production of fish (feed and well boats (6 FTE) and fish production(8FTE)), where other activities performed were related to hatcheries (3 FTE), packaging and processing (18FTE), feed production (7 FTE), and services related to aquaculture equipment (11 FTE) [281,282,283]. In other words, while

277 FHL (2013), *Environmental Report 2012: Norwegian Seafood Industry – Emphasizing facts and figures from 2012 up to July 2013*, p13.

278 SINTEF (2006), *The Economical Impact of the Fisheries and Aquaculture Industry in Norway – a Multiplier Effect Study.*

279 SINTEF (2006), *The Economical Impact of the Fisheries and Aquaculture Industry in Norway – a Multiplier Effect Study,* p6.

280 FHL (2013), *Environmental Report 2012: Norwegian Seafood Industry – Emphasizing facts and figures from 2012 up to July 2013*, p13.

281 FHL (2013), *Environmental Report 2012: Norwegian Seafood Industry – Emphasizing facts and figures from 2012 up to July 2013*, p13.

282 Figures are related to 2010.

283 The size of this site appears to be medium to large, but the report provides no precise figures. The representativeness of the site for the aquaculture sector as a whole is therefore hard to determine.

most certainly ancillary services are bought from specialised companies, aquaculture companies seem to provide ancillary services themselves too. In the end, this decreases the overall importance of the ancillary sector, since production companies can rely on their own operations to produce fish without relying too much on third party service providers.

In conclusion, the fishing and aquaculture industry thus seems to rely mostly on companies located in Norway, i.e. companies active in the primary sector mostly buy services from companies located in Norway (80%). Looking at the aquaculture sector specifically, the production of feed is perhaps the most significant and most important ancillary activity, with a professional aquaculture sector, producing large quantities of fish. Although farms themselves are also active in the production of feed, feed is mostly bought from specialised companies. These feed suppliers often rely to a large degree on the aquaculture sector. Meaning, when the aquaculture sector would disappear, these companies will most likely go out of business or at least be struck heavily.

Fishing seems to rely to a lesser extent on ancillary providers, where multipliers in fishing have been estimated to be below 1 and multipliers in aquaculture in aquaculture to be above 1. In other words, based on evidence in presented in this section the aquaculture sector seems to generate more employment in other sectors than the fishing sector, i.e. more supporting services seem to be needed in the aquaculture sector compared to the fishing sector. What is more, the aquaculture sector seems to require more specialised services such as the provision of feed, while the fishing sector relies on services that are provided by companies that are much less specialised and can also be provided to other industries (e.g. fuel, port facilities, maintenance of vessels and equipment, et cetera)[284]. Hence, resilience of the ancillary sector with respect to the fishing sector is estimated to be higher compared to the resilience of the ancillary sector in the aquaculture sector.

VII.6 Analysis of activities ancillary to marine fishing and aquaculture in the United States

Analysis on the primary sector[285]

Fishing is an important economic and cultural phenomenon in the United States. Historically, fishing has been an activity of considerable import, and today, the United States is one of the world's largest producers of fish[286]. This is due to the large coastal areas, marine life, numerous inland fishing opportunities and a well-organised infrastructure and economy capable of supporting fishing activities on a large scale.

The most important species that were caught in 2012 were sea scallops, shrimp, pacific salmon, American lobster and walleye Pollock[287]. These species account for most of the tonnage caught and value generated. Looking at regions, the most important fishery regions are both the west coast (California and Washington) and the east coast (Massachusetts to Washington D.C., Florida, and the Gulf of Mexico)[288] of the United States (see *Figure 130*). Alaska is an important fishing state as well.

284 When services can also be provided to other industries, this allows for diversifications lowering overall dependence on the primary fishing sector.

285 For the figures below, it is important to keep in mind that different sources are used to come to as comprehensive a picture as possible. Consequently, a number of small discrepancies may be present, and some figures may be hard to precisely compare. All financial figures are in €'s, calculated from $'s at an exchange rate of $1 to €0,94.

286 FAO (2014), *The State of World Fisheries and Aquaculture*, p10.

287 National Oceanic and Atmospheric Administration (2014), *Fisheries Economics of the United States 2012,* p12.

288 National Oceanic and Atmospheric Administration (2014), *Fisheries Economics of the United States 2012,* p12.

Figure 130. Primary fishing regions in the United States, excluding Alaska

The primary sector, looking at commercial fishing in particular, was responsible for 175.000 jobs in the United States in 2012[289]. A decrease was observed in 2009 and a period of recovery over 2010 and 2011, due to the financial crisis. Otherwise, employment has been steadily increasing year-over-year[290], indicating a growing fishing economy. This is also reflected in the income generated from this industry, with the primary commercial fisheries sector generating landings of €4,8 billion in value in 2012, up from €3,7 billion in 2009, excluding any ancillary activities and processing.

What must be noted is that employment in marine fishing can be very seasonal, due to fluctuating weather conditions in the United States. Looking at for instance Alaska – one of the main fishing regions in the United States – the monthly average employment over 2012 was reported as 8.189 FTE, where employment peaked in July at 24.761 FTE and was lowest in December at 853 FTE[291].

It is noteworthy that the U.S. Bureau of Labour Statistics projects a 5% decrease in jobs in the fishery industry from 2012 to 2022. This is attributed to increased hauls due to improved fishing gear and vessel design, the need for setting catch limits to conserve fish stocks and the hazardous nature of the job[292]. The median annual wage for fishing workers was around €31.400 in May 2012, only slightly lower than the median annual wage for all occupations in the United States[293].

Although the fishery economy seems significant in absolute terms, the contribution to the entire US economy is only a little less than 1% in employment, and about 0.5% of the national GDP (also taking into account processing and ancillary activities). It is interesting to note that the fisheries sector contributes more to employment than GDP, indicating lower revenue, profits and wages compared to other sectors, on average. This seems to be the trend for fishing worldwide, except for a number of speciality fisheries such as blue crab or American lobster[294].

Where innovation is concerned, the United States' National Fish and Wildlife Foundation has set up the Fisheries Innovation Fund in order to increase revenue and provide additional access and fishing opportunities for commercial and recreational fisheries[295]. The fund is aimed at improving both economic and societal aspects associated with fishing. According to the National Fish and Wildlife Foundation this is done by reducing by-catch, providing business and technical assistance to fishermen, employing new cost-

289 National Oceanic and Atmospheric Administration (2014), *Fisheries Economics of the United States 2012,* p12.

290 National Oceanic and Atmospheric Administration (2012), *Fisheries Economics of the United States 2011.*

291 Alaskan Government State Labor Statistics (2015), *Statewide Alaska Monthly Fish Harvesting Employment by Year, 2001 – 2012*.

292 United States Bureau of Labor Statistics (2015), *Occupational Outlook Handbook – Fishers and Related Fishing Workers*.

293 United States Bureau of Labor Statistics (2015), *Occupational Outlook Handbook – Fishers and Related Fishing Workers*.

294 Wages and revenues can be higher than the fishery sector average, due to the high market demand and price of these shellfish species

295 National Fish and Wildlife Foundation (2015), *http://www.nfwf.org/fisheriesfund/Pages/home.aspx.*

effective monitoring and reporting tools and designing and implementing harvest and quota systems that work for small-scale fishermen[296]. Up and until now, the fund has awarded around €7 million to 67 projects[297]. No quantitative data on the results was found, but recipients said the grant money helped them to support the fishing community in achieving their business goals and reducing by-catch[298].

Looking at aquaculture activities in the United States, this sector is much less significant. In 2008, around €0,9 billion was generated from aquaculture, with the sector being well established for a few decades, although its history goes back to the 19th century. In 2007, 39.500 people were employed either directly or indirectly in the aquaculture sector, of which around 10.000 people were employed in the primary sector and 30.000 people were employed in the indirect sector[299]. Unfortunately, no definition of the indirect employment for aquaculture is given, and the employment figures are not in FTE. In the past years, the aquaculture industry has had difficulties with sustaining growth due to high feed prices and inexpensive imported frozen fish fillet products from Asia[300]. The main species that are farmed relate to Atlantic salmon and catfish[301].

Although the contribution to the economy of the United States is small, aquaculture plays an important role in the communities of the South East of the United States (for instance in Arkansas, Louisiana and Mississippi), where catfish is farmed. About 37% of all primary aquaculture employment in the United States is located here, accounting for around 3.936 jobs[302].

According to the Bureau of Labour Statistics, the fishing and aquaculture industries are characterised by an overrepresentation of male workers[303]. This is the case in most countries, as can be seen in the analyses of other OECD countries.

The ancillary sector and its relationship to the primary sector

Taking the whole fishing – inland fishing and marine fishing – supply chain into account, the industry is extensive, both in terms of jobs and income generated. According to the Fisheries Economics of the United States report of 2012, the ancillary sector is well-established and accounts for the majority of the fishery sector's contribution to GDP, with the harvesting activities contributing only a relatively small part at €4,8 billion. Overall, they report 875.000 jobs in the ancillary sector in the United States[304]. Most of these ancillary jobs are found in the retail business, selling all kinds of fish products in supermarkets, specialised stores and restaurants, as well as fishing equipment and peripherals in equipment stores and through online channels. Maintenance and the supply of technical equipment are relevant ancillary activities as well.

Overall, the report explains that while the primary sector employs 175.000 people and generates 4.8 billion Euros, the sector ancillary to fishing employs 875.000 people and generates over 91 billion Euros in income, mainly in the retail industry, the seafood import sector and the wholesale industry[305]. In other words, for each employee in the primary sector, 5 people are being employed in the ancillary sector and for each Euro generated, 19 Euro is generated in the ancillary sector[306].

Looking specifically at a case study performed in Bristol Bay – one of the most important salmon fisheries in Alaska – approximately 1.987 FTE is employed in both processing and the primary sector, generating 132

296 National Fish and Wildlife Foundation (2015), *http://www.nfwf.org/fisheriesfund/Pages/home.aspx.*

297 National Fish and Wildlife Foundation (2015), *http://www.nfwf.org/fisheriesfund/Pages/home.aspx.*

298 National Fish and Wildlife Foundation (2015), *http://www.nfwf.org/fisheriesfund/Pages/what-our-grantees-say.aspx*

299 FAO (2015), *United States of America National Aquaculture Sector Overview,* http://www.fao.org/fishery/countrysector/naso_usa/en.

300 Ibidem.

301 Ibidem.

302 FAO (2015), *United States of America National Aquaculture Sector Overview,* http://www.fao.org/fishery/countrysector/naso_usa/en.

303 Bureau of Labor Statistics (2014), *Women in the Labor Force: A Databook*, p31. Also see country analyses of New Zealand, Japan and EU countries.

304 Calculated from National Oceanic and Atmospheric Administration (2014), *Fisheries Economics of the United States 2012.*

305 National Oceanic and Atmospheric Administration (2014), *Fisheries Economics of the United States 2012,* p6.

306 Please note that the definition used in this report does not correspond with the definition used in this study, as it is much broader including all downstream activities in the supply chain; from activities directly related to fishing to activities that involve selling the fish to the end-consumer.

million Euros directly from fishing activity[307]. According to research performed by the Institute of Social and Economic Research, the fishing industry generates an additional 5.582 FTE and 252 million Euros in the economy (including both induced and indirect effects). In other words, for each FTE generated in the primary sector, 2,8 FTE is generated in the entire economy and looking at income, 1,9 Euros is generated for each Euro generated in the primary sector (see *Figure 131*). It should be noted that both indirect and induced effects are included in this ancillary service definition.

	Direct	Indirect and induced effects	Total	Multiplier
FTE	1.987	5.582	7.839	2,8
Income	€135 million	€252 million	€387 million	1,9

Figure 131. Economic impact of fisheries at Bristol Bay, Alaska

A study performed by Maritime insights in 2014 provides a good picture of the services required by fishermen mooring at the port of Seattle by looking at their expenditures in the port area[308]. They found that purchases were made in the area of:

- Shipyard repair services
- Painting
- Electronic equipment
- Engine and propulsion services
- Fishing gear
- Packaging material
- Fuel
- Insurance
- Legal services
- Ship stores (food and supplies for the crew)

The purchases were also divided in purchases by type of vessel and were analysed based on total expenditures on each type of service mentioned above (see *Figure 132*). What becomes clear is that the biggest expenditures of fishing vessels relate to the provision of fuel, where insurance, maintenance services, and services related to the provision of equipment and supplies also form an important part of the expenditures of fishermen[309].

307 Institute of Social and Economic Research (2013), *The Economic Importance of the Bristol Bay Salmon Industry.*

308 Martin Associates (2014), *The 2013 Economic Impact of the Port of Seattle, p33.*

309 Martin Associates (2014), *The 2013 Economic Impact of the Port of Seattle, p33.*

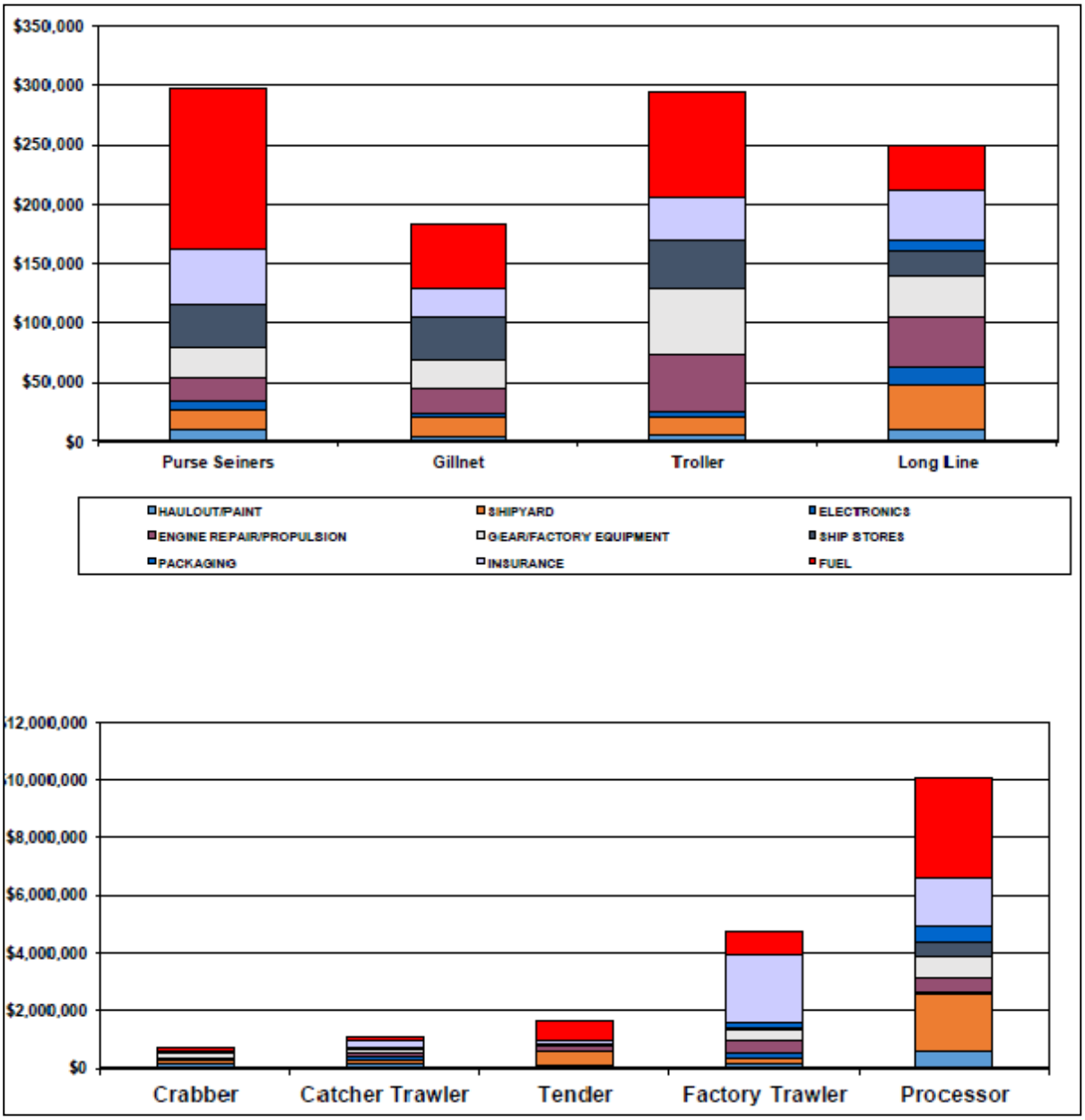

Figure 132. Purchases of fishing vessels in the port of Seattle in 2014

In this study the total economic impact of fishing on the port of Seattle has also been estimated[310]. Overall, about 8.253 people are employed in the primary sector, indirectly generating 4.735 jobs indirectly and 7.837 in the whole local economy (induced + indirect effects). In other words, for each FTE created in the primary sector, ~0,57 jobs are created in the ancillary industry and ~0,95 jobs are created in the entire economy, where the ancillary industry includes the activities mentioned earlier.

Looking at aquaculture, the FAO estimates that around 30.000 jobs are sustained by the ancillary aquaculture sector in the United States, against approximately 10.000 jobs in the primary sector, i.e. for each job in the primary sector, 3 jobs are generated in the ancillary aquaculture sector. What must be noted it that this includes employment generated in the entire aquaculture supply and thus after the first point of sale.

Looking specifically at a case study on bivalve aquaculture in Washington performed in 2013, around 810 jobs have been found in the entire local economy against 1.900 jobs in the primary sector; i.e. per FTE employed in the primary sector 0,43 FTE are employed in the entire economy taking into account both indirect and induced effects. Furthermore, it is estimated that in the entire economy 173 million Euros in

310 Martin Associates (2014), *The 2013 Economic Impact of the Port of Seattle*, p34.

output is generated, against 95,3 million Euros in output in the primary sector[311]; i.e. 1,8 Euros is generated in the entire economy for each Euro generated in the primary sector taking into account both indirect and induced effects (see *Figure 133*).

	Direct	Indirect and induced effects	Total	Multiplier
Jobs	1.900	810	2.710	0,43
Output value	€95,3 million	€173 million	€268,3 million	1,8

Figure 133. Economic impact of bivalve aquaculture in Washington in 2013

A similar case study was performed in 2013 in the region of California, yielding similar results: 0,4 FTE was found in the entire economy for each FTE in the primary sector and 1,95 Euro is generated in the entire economy for each Euro generated in the primary industry, taking into account both indirect and induced effects (see *Figure 134*)[312].

	Direct	Indirect and induced effects	Total	Multiplier
Jobs	200	80	280	0,4
Output value	€11,2 million	€21,8 million	€33 million	1,95

Figure 134. Economic impact of bivalve aquaculture in California in 2013

Another study performed by the National Oceanic and Atmospheric Administration in 2008, looking at the potential economic impact of offshore aquaculture in the United States, estimates that of the new jobs generated 33% would be in the primary farming activity, and 67% would be in downstream activities[313,314]; i.e. 2 jobs are generated in downstream activities for every 1 job in the primary aquaculture activities. It should be noted that this report does not mention the ancillary sector specifically and does not restrict downstream activities to the first point of sale.

Looking at some specific examples of ancillary services provided to the fishing and aquaculture industry in the United States such as the shipbuilding and maintenance industry, the fisheries industry seems to play a relatively small role. Of the 1.260 vessels delivered in 2013 by the totality of registered shipyards in the United States, 15 were commercial fishing vessels, amounting to 1,2% of all vessels delivered that year according to the Maritime Administration[315]. When for instance relating the fishery retail sector tot the total retail sector, similar figures have been found; while sales generated from fishery product seems significant in absolute terms (53,5 billion Euros in sales), the total retail sector generates around 4.500 billion Euros, which means that only about 1,2% of income generated in this sector is from fishery products. Interestingly enough, this is about the same as figures found for the shipbuilding and maintenance industry and roughly in accordance with the contribution of fisheries (primary and ancillary) to the United States' GDP.

Taking into account the results of the studies found related to the sector ancillary to marine fishing and aquaculture in the United States it can be concluded that, although many different definitions have been used throughout studies, multipliers tend to lie between 0,5 and 1,0. Nevertheless, figures presented in this section should be handled with much caution, since most of the studies are not completely transparent on the definitions they apply and which activities they include. Moreover, often induced effects are taken into account too in measuring the economic importance of fishing and aquaculture. Notwithstanding, using the data provided in this section a broad picture has been provided on the sector ancillary to marine fishing and aquaculture.

311 It is unclear from the study whether this is in FTE.

312 Northern Economics (2013), *The Economic Impact of Shellfish Aquaculture in Washington, Oregon and California.*

313 National Oceanic and Atmospheric Administration (2008), *Offshore Aquaculture in the United States: Economic Considerations, Implications & Opportunities*, chapter 8, p166.

314 These figures were calculated by taking the average of the farming total and downstream total.

315 Maritime Administration (MARAD) (2013), *The Economic Importance of the U.S. Shipbuilding and Repairing Industry*, p8.

With respect to the dependence of the ancillary sector with respect to the primary sector, and thus its resilience, most services provided do not seem to depend on the primary sector. Most of the services provided are not fishing industry-specific and are also provided to other industries as well; e.g. fuel, supplies, technical equipment, insurance. This is further substantiated by looking at for instance retail organisation and shipyards, where the fishing industry only contributes around 1% to this industry. Only in very specialised services, such as the provision and maintenance of fishing gears and the provision of fish feed, higher levels of dependence are expected. Unfortunately, more specific data indicating the overall dependence of the ancillary sector related to the fishing industry has not been found.

The dependency on the fishing industry – aquaculture and fishing – is also expected to be more significant in local communities that revolve around fishing, such as the aquaculture communities in the south east of the United States, or smaller coastal communities such as Dutch Harbour in Alaska[316]. A more specific example of such a small community is American Samoa, where the total export value of commodities was €16 million, of which €12,6 million was attributable to canned tuna[317]. The tuna canneries employed 12% of the American Samoan population, or 1.827 people. Furthermore, the tuna canneries directly and indirectly generated around 15% of wages, and 10 to 12% of household income[318]. Although tuna canning is a processing sector activity, this information does provide an idea of the high level of dependence on fisheries in American Samoa. Similar examples of local communities in the United States exist. Overall, a bad season in these communities can have tangible consequences for the surrounding community in terms of wages and living conditions.

316 International Port of Dutch Harbor, Unalaska (2015), *Unalaska Economy,* http://www.ci.unalaska.ak.us/community/page/economy.

317 Western Pacific Regional Fishery Management Council (2012), *Pelagic Fisheries of the Western Pacific Region*, p8-9.

318 Western Pacific Regional Fishery Management Council (2012), *Pelagic Fisheries of the Western Pacific Region*, p8-9.

Annex VIII – Bibliography OECD analysis

In this annex, a list of studies is provided that has been used for the analysis on other OECD countries, more specifically Canada, Japan, Iceland, New Zealand, Norway and the United States.

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