The Economic Impact of the Aquaculture Sector

Mulroy Bay

Bord Iascaigh Mhara

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BIM Ireland's Seafood Development Agency

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Executive Summary

THE CHARACTERISTICS OF MULROY BAY'S AQUACULTURE SECTOR

Mulroy Bay is home to seven businesses operating in the aquaculture sector, with activity concentrated in the mussel and other shellfish and oyster farming.

Our survey explores the characteristics of firms that are representative of activity in Mulroy Bay's aquaculture sector. Despite the economic challenges associated with the coronavirus pandemic, oyster farmers, and mussel and other shellfish farmers to some degree, are relatively optimistic about the future. Over half of oyster farmers expect turnover to increase next year, with two-fifths expecting the workforce to grow, and a similar share undertaking capital investment. Around two-fifths of mussel and other shellfish farmers expect turnover to grow, with the outlook for employment less optimistic. Both mussel and other shellfish and oyster farming are characterised by a high proportion of exports, with a majority of customers based in the EU.

Despite the positive outlook across both sub-sectors, respondents to the survey commonly cited a range of constraints on growth, most notably issues relating to regulations and licensing. Poor infrastructure, environmental challenges, and staff/skills shortages were also frequently identified.

THE AQUACULTURE SECTOR WITHIN THE BAY

The aquaculture sector makes a significant contribution to the Mulroy Bay economy. In 2020, direct aquaculture related activity at the bay generated €5.8 million in turnover and supported 32 direct jobs across the local bay economy. All sub-sectors have a presence in the bay, though finfish accounts for a disproportionately large share of the bay's total turnover. When translated into Gross Value Added (GVA)[1], the overall aquaculture sector makes a €2.7 million direct contribution to the local economy.[2]

Analysing the survey results allows us to quantify the bay's aquaculture sector value within the regional economy. Once the indirect and induced effects are calculated, we estimate that the total economic contribution of the aquaculture sector at Mulroy Bay equated to €3.5 million of GVA across the Border economy in 2020. The aquaculture sector at this bay also supported an estimated 46 jobs across the region, and generated €1.2 million in wages.

The direct values of aquaculture derived in this study contrasts with those derived from the National Seafood Survey (NSS) for 2020. The NSS and this study varied slightly in survey design and their resulting data sets contrast in: Response rates, use of category versus variable data and turnover versus farm-gate sales value, among other points. The data resulting from the NSS reports have the most up-to-date estimates of the sectors direct value. Any discrepancies in direct value between the two data sets do not affect the economic multipliers derived by the study.

€2.7 MILLION

DIRECT GVA IN 2020

The aquaculture sector makes a significant contribution within the local bay economy.

1. VA is a measure of the contribution an individual producer, industry, or sector makes to national GDP (which is equal to GVA plus taxes, minus subsides).

2. We define the bay economy as the District Electoral Division (DEDs) which broadly encompass the geographic spread of the local aquaculture industry - see Table 1.

€3.5 MILLION

TOTAL GVA CONTRIBUTION TO THE BORDER ECONOMY IN 2020

The aquaculture sector makes a significant contribution to the wider regional economy.

Table 1. Total aquaculture sector benefits, Border, 2020

Aquaculture Total	Border		
	GVA (€m)	Employment	Wages (€m)
Direct	2.7	32	0.6
Indirect	0.6	10	0.4
Induced	0.3	5	0.2
Total	**3.5**	**46**	**1.2**

Source: Oxford Economics, Perceptive Insight, CSO
Note: May not sum due to rounding.

SOCIO-ECONOMIC CHARACTERISITICS

The Mulroy Bay labour market is characterised by relatively high rates of unemployment and economic inactivity. This is in part due to the demographic characteristics: those aged 65 or over form a disproportionately high share of the resident population. The most recent data suggest that the local population has declined over recent years, with the falling population most apparent among those of working age, demonstrating the demographic challenges faced by the local area.

Agriculture, forestry and fishing is the largest employer across Mulroy Bay, driven to an extent by activities in the aquaculture sector. It alone accounts for almost a quarter of all employment locally, and provides employment opportunities for local residents who might otherwise have to commute elsewhere for work. The provision of accessible employment is also beneficial as the resident population of Mulroy Bay is typically less well-qualified than elsewhere.

As a result, the aquaculture sector is likely to continue to play an important role in the Mulroy Bay economy, through its provision of employment opportunities for local residents, supply chain spending in local businesses and the consumer spending it supports. Looking forward, a vibrant and growing local aquaculture sector is likely to remain a prominent asset for the local economy.

1. Introduction

1.1 ABOUT THE STUDY

The Irish aquaculture sector is an important component of both the wider seafood industry and the Irish economy. Its benefits are arguable felt most keenly across Ireland's coastal communities where the sector's activity tends to be concentrated: in coastal ocean waters, freshwater ponds, river inlets and bays.

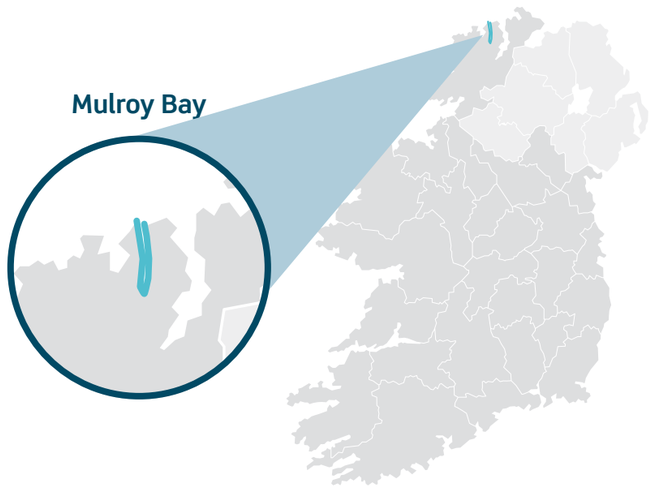
These coastal economies tend to be separated from major economic centres, have a narrower sectoral composition, and a relatively strong dependency on the seasonal/tourism industry. In addition, economic and employment growth is increasingly driven by office-based activity which favours urban areas. Given these challenges, the continued growth in Ireland's aquaculture industry can play a key role in addressing the balance across coastal areas - providing labour market opportunities, wages, whilst supporting economic activity in local supporting industries.

It is within this context that Bord Iascaigh Mhara (BIM) commissioned Oxford Economics and Perceptive Insight to estimate the economic contribution of the aquaculture sector in eleven of Ireland's bay areas.

1.2 THE AQUACULTURE SECTOR AT THE BAY

The report concentrates on aquaculture activity at just one of these bay areas - Mulroy Bay, located on the coast of Co. Donegal in the Border region. In this report we define the local bay economy as the District Electoral Divisions (DEDs) highlighted below. This area's boundary has been identified in cooperation with BIM with a view to broadly encompassing the geographic spread of the local aquaculture industry.

Figure 1. A map of the bay area within the study



To inform the analysis, a comprehensive aquaculture-related survey exercise was carried out across some of Ireland's most representative bay areas. We worked closely with BIM in order to, firstly, understand the aquaculture population at each of the 11 bay areas. Following this, the market research firm Perceptive Insight collected information concerning the characteristics of the local aquaculture sector through both telephone and online surveys.

In total, there were close to 130 aquaculture-related businesses approached who together have a presence in one or more of the bays studied. Of this total, 89 unique responses were recorded from aquaculture operators based in the 11 bay areas - a response rate of close to 70 percent, relative to the known aquaculture population. The study also draws on published data where available to better understand the sectoral composition of coastal areas within the country. Section 4 of this report includes a summary discussion of the pertinent issues facing the local bay economy.

1.3 THE KEY ELEMENTS OF THE AQUACULTURE SECTOR

In this study we present our estimates of the size of the local aquaculture sector and how it impacts the regional economy. Our analysis therefore estimates the direct activity associated with the farming of finfish, oysters, mussels and other shellfish.[3] This has been achieved by drawing on the survey findings, published data sources and industry specific information held by BIM. This information then allowed the estimation of the sector's wider impacts across the NUTS3 region.[4] These wider impacts include those associated with the aquaculture sector's supply chain and the consumer spending of those employed as a result of the direct and indirect activity - see Introducing Economic Impact Analysis (next) and Figure 2 for more detail concerning our methodology.

3. The analysis also incorporates the economic impacts associated with the processing of aquaculture related output within the producing sector's population.

4. There are eight regions at NUTS3 level in Ireland which came into existence in 1994, under the terms of the Local Government Act 1991, each is governed by an associated Regional Authority.

INTRODUCING ECONOMIC IMPACT ANALYSIS

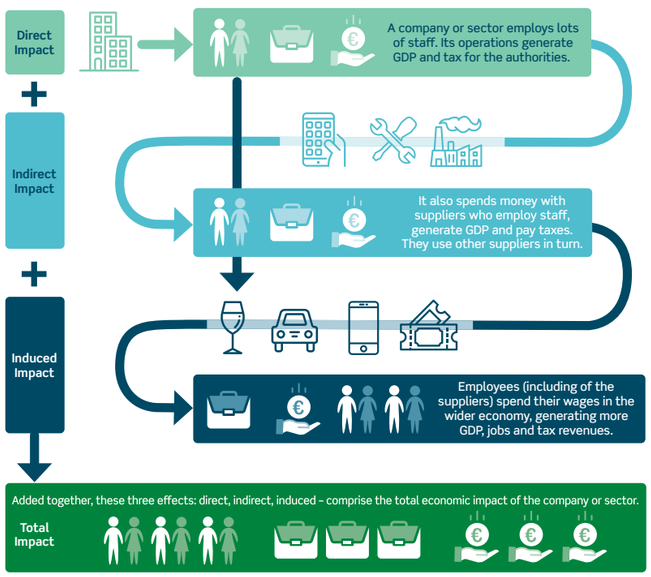
The economic impact of a sector is measured using a standard means of analysis called an economic impact assessment. The report quantifies the three 'core' channels of impact that comprise an organisation/sector's 'economic footprint':

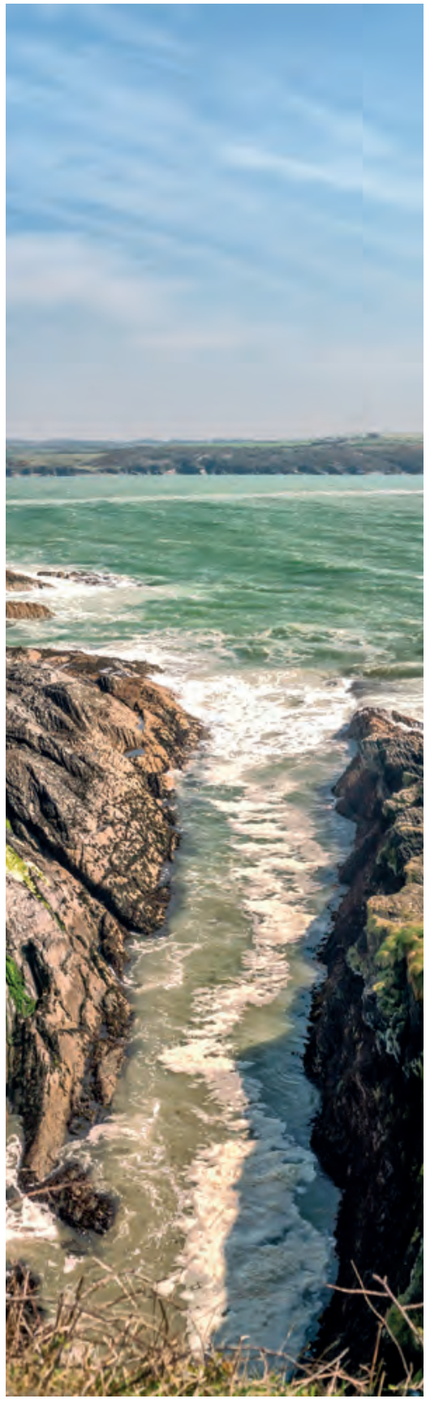
- **Direct impact**, which is the economic activity the aquaculture sector generates because of its operations;
- **Indirect impact**, or supply chain impact, that occurs because the sector buys inputs of goods and services from Irish businesses; and the
- **Induced impact**, which relates to the wider economic benefits that arise when employees of the local aquaculture sector and its supply chain spend their wages in the consumer economy, for example in local retail establishments.

We analyse these channels of impact using three core metrics:

- **Employment**, measured on an employee job basis;
- **Wages**, the total value of remuneration offered to the workers associated with these activities (in current prices);
- **Gross value added** contribution to GDP (in current prices); and,
- **Tax receipts** generated by the Irish activity and employment supported by the aquaculture sector.

Figure 2. Economic Impact Assessment





1.4 REPORT STRUCTURE

This report breaks down the characteristics of the aquaculture sector within the bay area. It then goes on to show the economic impact this activity creates across the Border economy.

The report takes the following structure:

- An analysis of the characteristics of the aquaculture sector within the local bay economy.
- A breakdown of the total economic benefits associated with the bay's aquaculture sector at the regional and national economy level; and
- Finally, we present a summary of the pertinent issues facing the local bay economy.

2. Aquaculture at Mulroy Bay

2.1 INTRODUCTION

Our survey of aquaculture businesses provides a range of insights into the characteristics of aquaculture businesses operating in the 11 bays covered by our study. In this section of the report we draw on the survey findings to describe the types of aquaculture firms in Mulroy Bay.

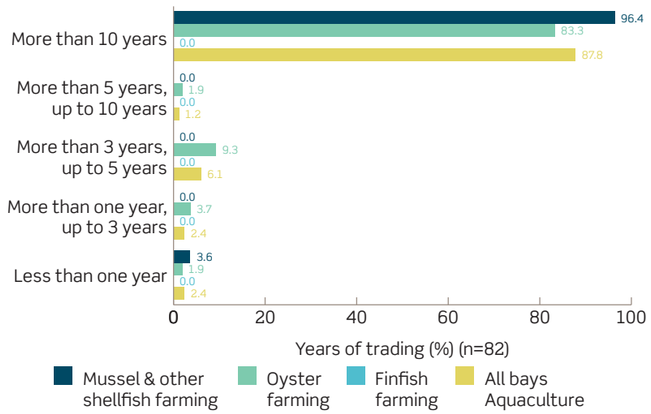
There were seven aquaculture related businesses operating within the Mulroy Bay economy in 2020, mostly focussed on mussel and other shellfish and oyster farming, with some activity in finfish farming. Four of the seven businesses responded to our survey. Given the relatively small sample size, our analysis considers the broader characteristics of firms in the mussel and other shellfish farming and oyster sub-sectors,[5] drawn from the overall survey results.

2.2 CHARACTERISTICS OF THE LOCAL AQUACULTURE SECTOR

2.2.1 BUSINESS CHARACTERISTICS

Mussel and other shellfish and oyster businesses tend to be relatively mature. Nearly 90 percent of the mussel and other shellfish and oyster firms surveyed were trading for more than 10 years.

Figure 3. Aquaculture maturity, aquaculture sub-sectors, 2020



Source: Oxford Economics, Perceptive Insight

5. The sample of businesses in the finfish farming sub-sector is not of a sufficient size to draw any meaningful conclusions on their characteristics.

2.2.2 RECENT PERFORMANCE AND OUTLOOK: TURNOVER

We estimate that turnover from the nine aquaculture businesses in Mulroy Bay totalled €5.8 million in 2020.

Overall, firms operating in the aquaculture sector had a challenging 2020 in terms of turnover. Over half of oyster farmers reported a fall in turnover compared to approximately one quarter that experienced growth. Similarly, 46 percent of mussel and other shellfish farmers experienced a fall in turnover while only 11 percent enjoyed turnover growth in 2020.

However, mussel and other shellfish and oyster farmers were more positive about the future: over two-thirds of oyster farmers and over two-fifths of mussel and other shellfish farmers expected an increase in turnover in the coming year.

Table 2. Turnover over the past and coming 12 months, aquaculture sub-sectors, 2020 and 2021

Respondents (%) (n=89)	Increased	Stayed the same	Decreased
Change in turnover over the previous year:			
Mussel and other shellfish farming	15	36	48
Oyster farming	26	20	54
Finfish farming	50	0	50
All bays aquaculture	**22**	**26**	**52**
Expected change in turnover over the next year:			
Mussel and other shellfish farming	42	58	0
Oyster farming	69	30	2
Finfish farming	50	50	0
All bays aquaculture	**58**	**40**	**1**

Source: Oxford Economics, Perceptive Insight
Note: May not sum due to rounding.

2.2.3 RECENT PERFORMANCE AND OUTLOOK: EMPLOYMENT

Despite lockdowns imposed in the wake of the Coronavirus pandemic, the workforce of firms in the aquaculture sector remained relatively resilient through 2020. Indeed, 91 percent of mussel and other shellfish farmers, and 80 percent of oyster farmers saw employment either remain the same or increase over the previous year.

Looking forward, oyster farmers were relatively optimistic about the coming year, with 41 percent of respondents expecting the workforce size to increase. Mussel and other shellfish farmers by contrast were less optimistic, with just 12 percent of firms expecting to expand workforce levels. In both instances few firms expect a loss of jobs over the coming year. However, firms across each of the sub-sectors are generally less optimistic about expanding the size of the workforce in the coming year than increasing turnover.

Table 3. Employment over the past and coming 12 months, aquaculture sub-sectors, 2020 and 2021

Respondents (%) (n=89)	Increased	Stayed the same	Decreased	Not sure
Change in turnover over the previous year:				
Mussel and other shellfish farming	12	79	9	0
Oyster farming	17	63	20	0
Finfish farming	0	100	0	0
All bays aquaculture	**15**	**70**	**16**	**0**
Expected change in turnover over the next year:				
Mussel and other shellfish farming	12	88	0	0
Oyster farming	41	54	4	2
Finfish farming	0	100	0	0
All bays aquaculture	**29**	**67**	**2**	**1**

Source: Oxford Economics, Perceptive Insight
Note: May not sum due to rounding.

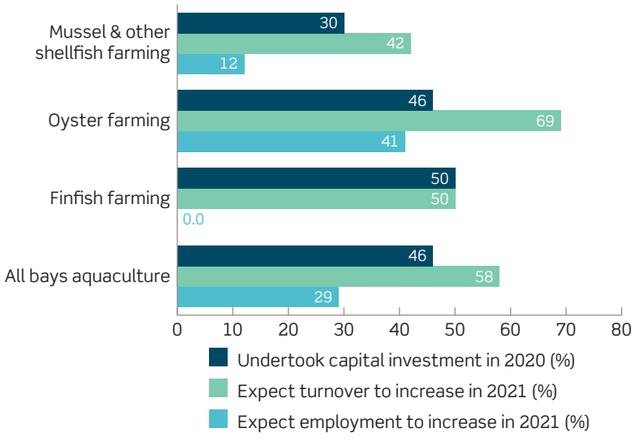
2.2.4 CAPITAL INVESTMENT

Revenue expansion and/or access to new markets is often linked to investment: improving the quantity and/or quality of capital available to the workforce, thereby improving productivity levels. On the one hand, the willingness of firms to engage in capital investment may in itself signal a positive outlook for the future; on the other, it may reflect the deterioration of existing capital stocks.[6]

Our survey results hint at the prevalence of the former across the aquaculture sector: alongside a majority of firms expecting turnover to increase, two-in-five engaged in capital investment over the previous year. Oyster farmers tend to be relatively optimistic: alongside the 46 percent investing in capital, more than two-thirds expect turnover to grow. Mussel and other shellfish farmers by contrast tend to be slightly less optimistic: less than a third of firms made capital investments, and only two-fifths expect an increase in turnover in the coming year.

However, of those firms that made capital investments, mussel and other shellfish farmers invested a greater share of turnover on average (21 percent) than their counterparts in oyster farming (18 percent), while 72 percent of investment is undertaken regionally, compared to 56 percent among oyster farmers.

Figure 4. Capital investment prevalence in the previous year and expectations for the next year, aquaculture sub-sectors, 2020 to 2021



Source: Oxford Economics, Perceptive Insight
Note: May not sum due to rounding.

6. Owing to limitations in the data provided by respondents, we are unable to determine either the scale of capital investment, or prevalence of spending within the wider regional economy.

2.2.5 GROWTH CONSTRAINTS

Given that a minority of firms have invested in their business recently, our survey also explored the main constraints to growth. The most commonly cited issue for both mussel and other shellfish and oyster farmers is regulations and licensing. More than three-quarters of oyster farmers, and over half of mussel and other shellfish farmers, identified this as a constraint on growth. Nearly two-thirds of oyster farmers also cited environmental challenges/disease as a further issue, while just under half also identified staffing/skills shortages and quality of facilities/maritime infrastructure/planning. These issues were also commonly highlighted among mussel and other shellfish farmers, albeit less frequently than among oyster farmers.

Table 4. Main constraints on future growth, aquaculture sub-sectors, 2021

Respondents who highlighted issue (%) (n=89)	Mussel and other shellfish farming	Oyster farming	Finfish farming	All bays aquaculture
Regulations and licensing	57.6	75.9	100.0	69.7
Environmental challenges/ disease	33.3	63.0	50.0	51.7
Staffing/skills shortages	39.4	48.1	0.0	43.8
Quality of facilities/ maritime infrastructure/ planning	39.4	40.7	50.0	40.4
Access to finance	27.3	24.1	50.0	25.8
Other	0.0	0.0	0.0	18.0
Fuel costs	6.1	24.1	0.0	16.9
Insurance	9.1	20.4	50.0	16.9
Transport issues	12.1	16.7	0.0	14.6
BREXIT legacy issues	15.2	9.3	0.0	11.2

Source: Oxford Economics, Perceptive Insight
Note: May not sum due to rounding.

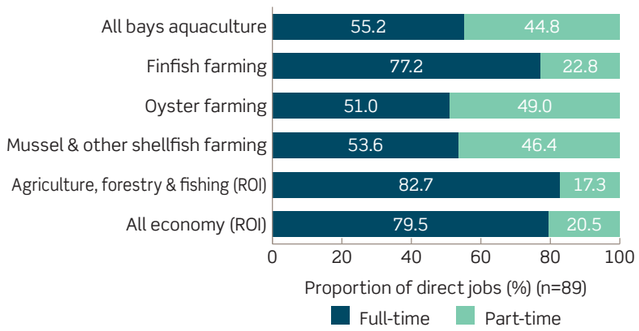
2.2.6 CHARACTERISTICS OF THE WORKFORCE

We estimate the seven aquaculture businesses at Mulroy Bay directly supported 32 jobs in 2020, across both mussel and other shellfish and oyster farming.

The survey findings show that both mussel and other shellfish and oyster farming have a relatively high prevalence of part-time employment, accounting for almost half of the workforce for both sub-sectors, compared to around 20 percent across the overall economy.

The prevalence of part-time working may in part explain the relatively low average wages earned by workers in the aquaculture sector at Mulroy Bay, estimated to be €19,900 in 2020.

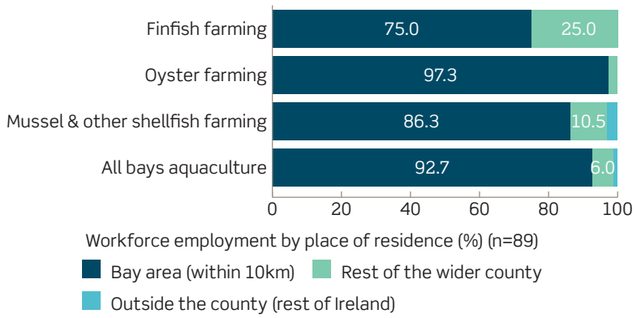
Figure 5. Employment by status, 2020



Source: Oxford Economics, Perceptive Insight. CSO

Perhaps as a result, local firms tend to draw their workforce from the local resident population. In total, 97 percent of workers in oyster farming, and 86 percent in mussel and other shellfish farming, are drawn from within 10km of the local bay area. While only a limited sample size, respondents in Mulroy Bay similarly indicate that that the local aquaculture workforce is almost entirely drawn from local residents.

Figure 6. Employment by place of residence, aquaculture sub-sectors, 2020

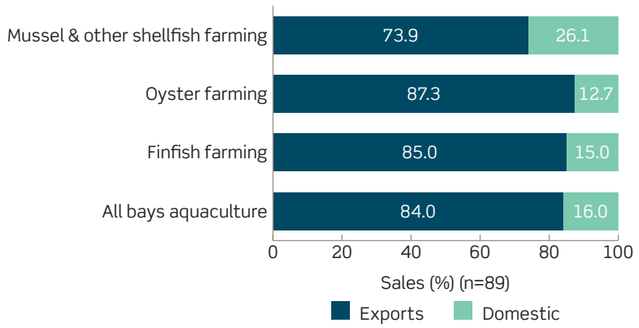


Source: Oxford Economics, Perceptive Insight

2.2.7 EXPORTS

The aquaculture sector enjoys relatively strong exposure to export markets. Across the sector as a whole, more than four-fifths of the value of total sales are to overseas customers. The exposure to export markets is somewhat higher for oyster farmers, accounting for 87 percent of total sales value. By contrast, over a quarter of mussel and other shellfish farming sales are made domestically.

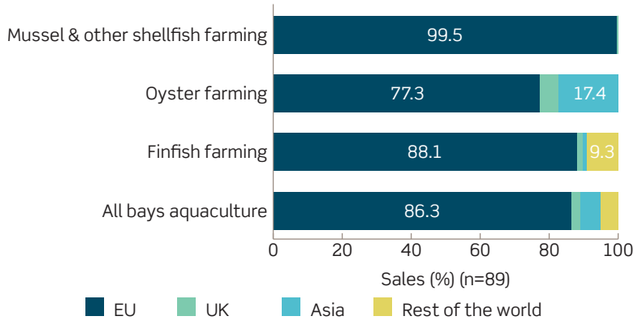
Figure 7. Sales by destination, aquaculture sub-sectors, 2020



Source: Oxford Economics, Perceptive Insight

Export sales across the aquaculture sector are primarily to customers in the EU. According to our survey respondents, mussel and other shellfish farmers are particularly reliant on EU customers, which form nearly all of their exports. The destination of oysters is more varied: while around three-quarters of exports are to the EU, around 17 percent of sales are made to Asia, and a further five percent to the UK. While limited by sample size, our survey indicates that an even higher proportion of aquaculture exports from Mulroy Bay are sold to the EU than the aquaculture sector as a whole.

Figure 8. Export sales by origin, aquaculture sub-sectors, 2020

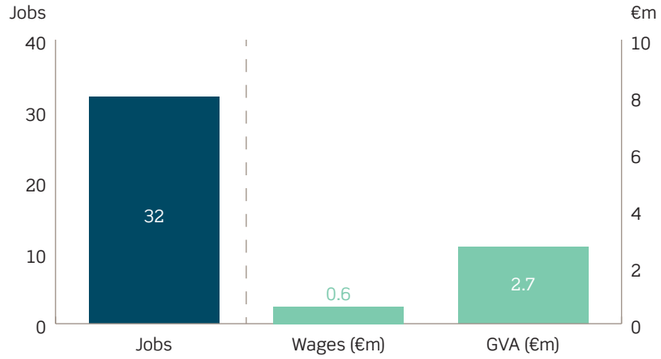


Source: Oxford Economics, Perceptive Insight

2.3 DIRECT CONTRIBUTION TO THEMULROY BAY ECONOMY

Using data from our survey and performance data held by BIM, we estimate that the above businesses directly generated sales of €5.8 million in 2020. This economic activity was enough to create a direct Gross Value Added (GVA) contribution to GDP of €2.7 million. In addition, the sector directly supported 32 workplace jobs in the bay area and generated €0.6 million in direct wages.

Figure 9. Aquaculture's direct economic contribution, Mulroy Bay, 2020



Source: Oxford Economics, Perceptive Insight, BIM

2.4 CONCLUSION

Seven aquaculture firms operate at Mulroy Bay, with firms typically active in the mussel and other shellfish and oyster farming sub-sectors. We estimate that thelocal aquaculture sector generated €5.8 million in turnover in 2020, and directly sustained an estimated 32 jobs, with around half of workers doing so on a part-time basis.

Despite the economic challenges associated with the coronavirus pandemic, oyster farmers, and mussel and other shellfish farmers to some degree, are relatively optimistic about the future. Over half of oyster farmers expect turnover to increase next year, with two-fifths expecting the workforce to grow, and a similar share undertaking capital investment. Around two-fifths of mussel and other shellfish farmers expect turnover to grow, with the outlook for employment less optimistic. Both mussel and other shellfish and oyster farming are characterised by a high proportion of exports, with a majority of customers based in the EU.

Despite the positive outlook across both sub-sectors, respondents to the survey commonly cited a range of constraints on growth, most notably issues relating to regulations and licensing. Poor infrastructure, environmental challenges, and staff/skills shortages were also frequently identified.

3. Total impact of the bay's aquaculture sector

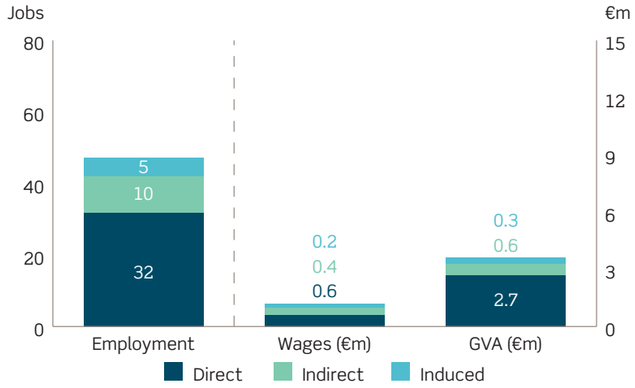
3.1 AQUACULTURE SECTOR ACTIVITY WITHIN THE BAY

This section takes the estimates presented in the preceding sections of the report and calculates the total economic impact resulting from the activities of the aquaculture sector within the bay area.

3.2 REGIONAL ESTIMATES

We estimate that the aquaculture sector at Mulroy Bay contributed €3.5 million of GVA to the Border economy in 2020. The aquaculture sector supported 46 jobs across the region, generating €1.2 million in wages for those employed.

Figure 10. Benefits of the aquaculture sector, Border, 2020



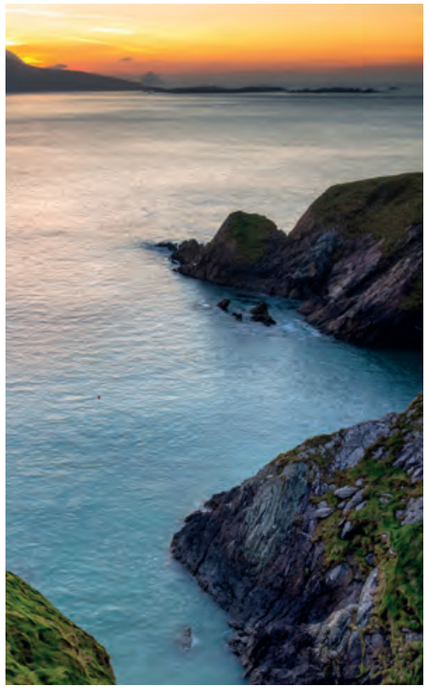
Source: Oxford Economics, Perceptive Insight, CSO

Almost a quarter of the GVA total is generated either in indirect activities supporting the local aquaculture sector (€0.6 million) or through additional induced spending that results from the employment supported by the sector and its supply chain (€0.3 million). As a whole, Mulroy Bay's aquaculture sector is estimated to have a GVA multiplier of 1.3, meaning that for every €1 GVA contribution to GDP, a further €0.3 is generated within the regional economy.

Table 5. Total aquaculture sector benefits, Border, 2020

Bay aquaculture	Border		
	GVA (€m)	Employment	Wages (€m)
Direct	2.7	32	0.6
Indirect	0.6	10	0.4
Induced	0.3	5	0.2
Total	**3.5**	**46**	**1.2**

Source: Oxford Economics, Perceptive Insight, CSO
Note: May not sum due to rounding.



In GVA terms, the agriculture, forestry and fishing sector benefits most from Mulroy Bay's aquaculture sector. It supported €2.7 million of GVA across the Border region in 2020, equivalent to 78 percent of local aquaculture's total contribution across the region. Agriculture forestry and fishing accounts for an almost identical share of the sector's employment benefits 74 percent (34 jobs). The impacts in this sector are bolstered by the presence of aquaculture's direct activity within this broad sector of the economy.

Economic impacts across the remaining sectors are more evenly spread and therefore represent a much smaller share of the total relative to agriculture, forestry and fishing. The professional, scientific and technical services sector receives the next largest benefit resulting from aquaculture activity locally. It accounts for five percent of the overall GVA benefit across the region (€0.2 million), alongside sustaining three jobs and generating €0.1 million in earnings.

The regional wholesale and retail trade, manufacturing, and finance and insurance sectors are all among the next-most prominent beneficiaries in GVA terms (all €0.1 million).

Table 6. Total benefits by sector, South-West, 2020

	Border		
	GVA (€m)	Employment	Wages (€m)
Agriculture, forestry and fishing	2.7	34	0.7
Mining and quarrying	0.0	0	0.0
Manufacturing	0.1	1	0.1
Electricity, gas and water	0.0	1	0.0
Construction	0.0	0	0.0
Wholesale and retail	0.1	2	0.1
Transportation and storage	0.0	1	0.0
Accommodation and food	0.0	1	0.0
Information and communication	0.0	0	0.0
Financial and insurance	0.1	1	0.0
Real estate activities	0.0	0	0.0
Professional, scientific and technical	0.2	3	0.1
Administrative and support	0.0	1	0.0
Public admin and defence	0.0	0	0.0
Education	0.0	0	0.0
Human health and social work	0.0	0	0.0
Arts, enter and recreation	0.0	0	0.0
Other service activities	0.0	0	0.0
Total	**3.5**	**46**	**1.2**

Source: Oxford Economics, Perceptive Insight, CSO
Note: May not sum due to rounding.

At the national level the local aquaculture sector's economic benefits are larger still - accounting for economic leakage outside the bay's own region and into the remainder of the country. In total, aquaculture in Mulroy Bay is estimated to have provided a GVA contribution of €4.5 million across the country, sustaining 60 jobs and €1.8 million in earnings.

Table 7. Total aquaculture benefits, Ireland, 2020

Total aquaculture	Ireland		
	GVA (€m)	Employment	Wages (€m)
Direct	2.7	32	0.6
Indirect	1.3	19	0.9
Induced	0.6	8	0.3
Total	**4.5**	**60**	**1.8**

Source: Oxford Economics, Perceptive Insight, CSO
Note: May not sum due to rounding.

3.3 FISCAL BENEFITS

Aquaculture activity at the bay provides further benefits through the generation of tax revenues to the Revenue Commissioners. These fiscal impacts can again be split into their direct, indirect and induced components depending on what channel of activity they originate from. We estimate that the bay'saquaculture sector's direct tax contribution equated to €0.26 million in 2020, consisting of both the labour-based tax paid by the sector's employees (income tax, PRSI etc), taxes on consumption and corporation tax receipts.

The indirect fiscal benefits represent the same taxation components as above but are generated within the sector's wider supply chain, in addition to net taxes on input purchases and sectoral taxation on production less subsidies. Combined these represent a net fiscal benefit of €0.33 million. As those employed in the sector and within its supply chain spend their wages, this supports further jobs and activity within the Irish economy. We estimate this induced activity supported a further €0.14 million in tax revenue.

Therefore, in total, Mulroy Bay's aquaculture sector is estimated to have supported €0.73 million in fiscal benefits in 2020. This total was made up of €0.40 million in employment/labour related tax, €0.19 million in taxation associated with the spending of wages, €0.12 million in corporation tax, and a net tax benefit of €0.03 million through taxation on inputs and production.[7]

[7] Net tax position refers to taxes less subsidies.

Table 8. Estimated tax benefits by type, Ireland, 2020

Total aquaculture	Tax estimates (€m)			
	Direct	Indirect	Induced	Total
Net tax on inputs	NA	0.06	0.02	0.07
Consumption tax	0.06	0.09	0.03	0.19
Taxes on production	NA	-0.05	0.01	-0.04
Corporation tax	0.05	0.06	0.01	0.12
Labour tax	0.15	0.18	0.07	0.40
Total	**0.26**	**0.33**	**0.14**	**0.73**

Source: Oxford Economics, Perceptive Insight, CSO
Note: May not sum due to rounding.

3.4 CONCLUSION

Our analysis shows that the aquaculture sector at Mulroy Bay supports 46 jobs, €1.2 million in wages and €3.5 million in GVA throughout the Border economy. Furthermore, this activity is estimated to support €0.73 million in tax revenues towards the public purse.

4. Aquaculture and the local economy

4.1 BAY POPULATION

Mulroy Bay has experienced population decline in recent years. The population level has fallen by 1.6 percent in the five years between 2011 and 2016. The rate of decline has therefore outpaced that across Donegal (1.2 percent decline) and is significantly weaker than the Ireland average (3.8 percent growth). Declining population levels are usually a sign that there may be limited employment opportunities locally.

Table 9. Population indicators, 2016

Population Area	Growth (2011-2016)		2016	
	Population	Working age (15-64)	Population	Working age share
Mulroy Bay	-1.6%	-5.3%	6,434	60.0%
Co. Donegal	-1.2%	-3.5%	15,9192	62.3%
Ireland	**3.8%**	**1.4%**	**4,761,865**	**65.5%**

Source: CSO
Note: May not sum due to rounding.

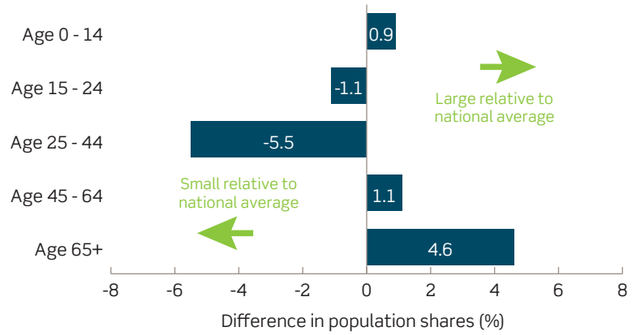
4.2 WORKING AGE

Furthermore, the working age population - those aged 15-64 - declined at a faster pace of 5.3 percent. This was a stronger decline than that experienced across the county (3.5 percent fall) and was weaker still in comparison to the national average of 1.4 percent growth. Indeed, the working age cohort is relatively small in Mulroy Bay, compared to the county and national levels.

The local population is skewed towards the younger- and older-age groups. Those aged 0-14 account for close to a fifth of the local population, a share 0.9 percentage points larger than the national average. Similarly, Mulroy Bay has a proportionately higher share of those aged 45-65 and 65+ (1.1 and 4.6 percentage points larger than the national average).

By contrast, the share of those aged 15-24 and 25-44 is 1.1 and 5.5 percentage points smaller than the national average, respectively.

Figure 11. Age group comparisons, Bay area vs Ireland, 2016



Source: Source: CSO Ireland
Note: May not sum due to rounding.

4.3 UNEMPLOYMENT

The latest available data indicates that Mulroy Bay's labour market is underperforming the broader regional and national economies. The unemployment rate (19.7 percent) is higher than both the regional and national rates. Likewise, the local employment rate lags both the Border region (49.8 percent) and Ireland as a whole (53.4 percent).[8]

Data from the Central Statistics Office reveals that the economic inactivity rate among those residents ages 15 and over was 43.7 percent in 2016 - higher than both the regional (40.9 percent) and national (38.6 percent) rates.[9] This is likely to reflect the above average share of residents aged 65 and over.

Table 10. Headline economic indicator comparisons, 2016

	Unemployment rate	Employment rate	Inactivity rate
Mulroy Bay	19.7%	45.2%	43.7%
Border	15.7%	49.8%	40.9%
Ireland	**12.9%**	**53.4%**	**38.6%**

Source: CSO
Note: May not sum due to rounding.

8. Defined as those in work as a proportion of the population age 15 years and over.

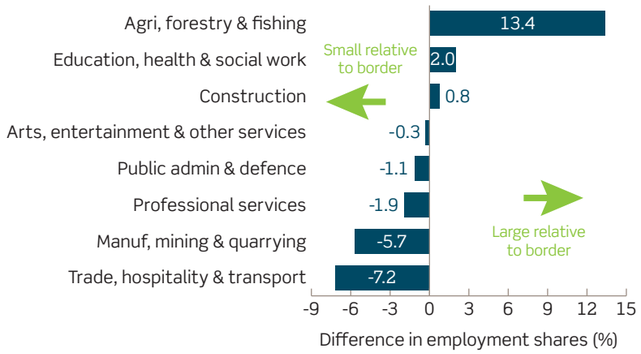
9. Economic inactivity represents the share of the population aged 15 and over who were neither employed nor looking for employment.

4.4 SECTOR STRUCTURE

An analysis of Mulroy Bay's sectoral structure shows the economy is underrepresented in the higher value added and higher paid growth sectors of public administration and defence and professional services.

Instead, the economy is reliant on lower value-added sectors such as agriculture, forestry and fishing and construction. The share of jobs in the education, health and social work sector is also above the regional average. This sectoral structure would suggest the economy will struggle to create above average jobs growth and wealth, relative to the national average, and relative to urban centres across the country where the higher value added private services tend to favour.

Figure 12. Employment share differences, Bay area vs region, 2016

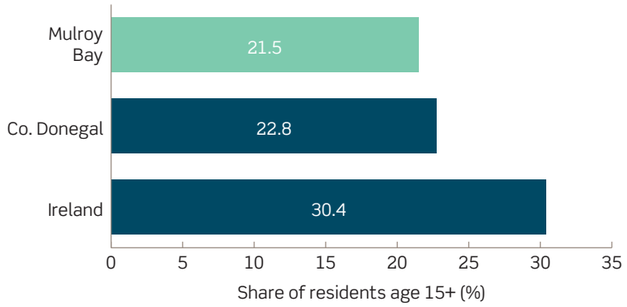


Source: Oxford Economics, CSO

Given, the sectoral structure it is no surprise that Mulroy Bay experiences net out-commuting as residents take up employment opportunities elsewhere. Census data from 2016 revealed that there were nearly 1,800 workplace jobs within the Mulroy Bay area. Meanwhile, there were 2,300 residents employed, meaning that nearly 500 more people regularly commuted out of Mulroy Bay compared to those that commute the opposite direction to take up employment.

In addition, as we might expect, residents of Mulroy Bay are generally less well-educated than elsewhere in Ireland. Those educated to degree level or above accounted for 22 percent of the population aged 15 and above in 2016. This share is below that of both the Donegal and the national average (23 percent and 30 percent). As a result, Mulroy Bay's population has a higher share of educational attainment at secondary level or lower relative to the national average (59 percent and 49 percent respectively).

Figure 13. Degree level or above attainment, 2016

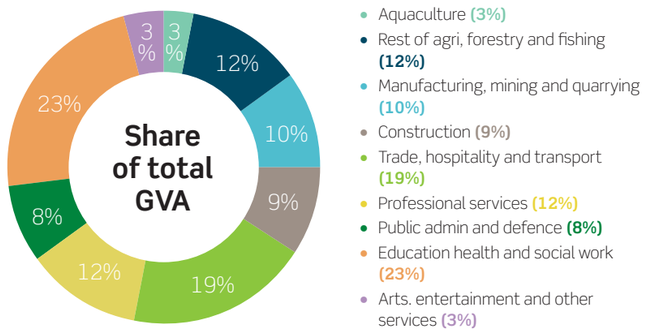


Source: CSO

4.5 THE LOCAL ECONOMY'S CHARACTERISTICS

The latest Census provides workplace employment data at a sectoral level for small area District Electoral Divisions (DEDs) across Ireland. By combining this employment data with our regional productivity estimates we can quantify the economic footprint of the bay economy. We estimate that Mulroy Bay's economy made a GVA contribution to GDP of €80 million in 2020.[10] We estimate that the aquaculture sector within the bay represented €2.7 million of this GVA total. The largest sectors in GVA terms were the 'education, health and social work' and 'trade, hospitality and transport' sectors which represented 23 percent and 19 percent of the local economy respectively.

Figure 14. GVA by sector, Mulroy Bay, 2020

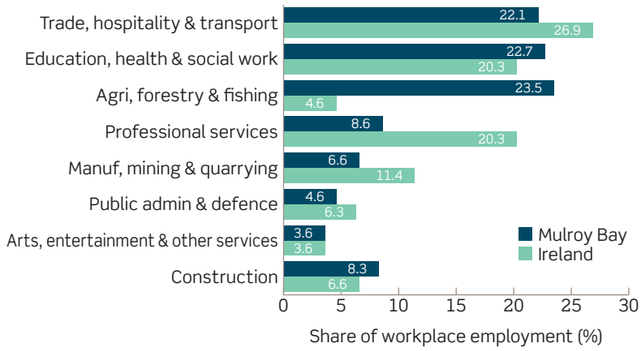


Source: Oxford Economics, Perceptive Insight, CSO

10. When estimating the size of the bay economies we use the most recent workplace sectoral employment data from the 2016 census. This employment data relates to workplace zones, which are slightly smaller than DEDs. The workplace zones are therefore mapped across to closely represent the DEDs which cover the bay area. We then supplement this data with the current snapshot of the local aquaculture sector as estimated through the survey exercise. Finally, we subtract the direct aquaculture activity from the broader 'Agriculture, forestry and fishing' sector to get an indication of its prominence locally.

In employment terms, aquaculture remains an important contributor within the bay economy. The combined farming of finfish, oysters and mussels is estimated to represent 1.7 percent of workplace employment across the bay economy in 2020. Furthermore, the aquaculture sector represented just under a tenth of total 'agriculture, forestry and fishing' related employment locally.

Figure 15. Employment by sector, Kenmare Bay, 2020



Source: Oxford Economics, Perceptive Insight, CSO

4.6 SUMMARY

The Mulroy Bay labour market exhibits higher economic inactivity and lower employment rates than across Donegal and Ireland as a whole. Thedemographics of the local area show that the working age population has been in decline and the working age share of the population remains lower than both county and national averages. Furthermore, the local economy is subject to a net outflow of commuters, as more residents are in employment than jobs available within the local economy. The extent to which this may continue into the future will depend on whether local job creation will be sufficient to meet the needs of the working age population.

Agriculture, forestry and fishing forms a relatively large proportion of economic activity within the local bay economy, driven to an extent by activities in the local aquaculture sector. Education, health and social work is the largest sector locally in GVA terms, and supports a larger proportion of jobs locally than across the wider Border region. However, the local economy is underrepresented among professional services and other sectors typically provided by the public sector, such as public administration and defence.

As a result, the aquaculture sector is likely to continue to play an important role in the Mulroy Bay economy, through its provision of accessible direct jobs, supply chain spending in local businesses and the consumer spending it supports. Looking forward, a vibrant and growing aquaculture sector is likely to remain a prominent asset for the local economy.

APPENDIX 1
Model Approach

UNDERSTANDING ECONOMIC IMPACT ASSESSMENTS

A sector can generate benefits through four different channels. The first three are the standard channels through which economic impact is usually quantified: direct operational effects, supply chain effects, and the impact of employees spending their wages in the wider consumer economy. These are the focus of this study. The fourth channel, known as 'catalytic' or 'dynamic' benefits represent the wider benefits that society and/or other industries derive from the original economic activity. Catalytic benefits are often difficult to quantify. They include softer benefits such as diversifying an economy, providing a source for part-time employment and source for jobs outside of growth sectors.

Our report uses three main metrics to quantify each of the channels by which the aquaculture sector could contribute to the regional[11] and national economy:

- **Gross value-added** contribution to Gross Domestic Product (GDP)[12]: this measured the value of goods and services produced in an area, industry or sector of an economy and is equal to output minus intermediate consumption;
- **Employment:** Employment is presented in terms of employee jobs, the combination of workplace employment by full time and part time status;

  and

- **Wages** is the total value of remuneration offered to the workers associated with the local aquaculture sector.

All the data used was either provided by BIM (for example recent industry registration data), the aquaculture sector survey carried out by Perceptive Insight or published government website data and industry standards from the likes of CSO Ireland and Oxford's own economic databases. Finally, in the absence of data, reasonable assumptions based on best judgement are clearly rationalised in the study. For example, in the absence of bay specific data we will use published sources for comparator geographies as a proxy estimate were appropriate.

ESTIMATING THE DIRECT ECONOMIC CONTRIBUTION

The first step was to understand the direct activity associated with the local aquaculture sector at each of the 11 bays in 2020.

11. Ideally, we would quantify the impacts of the aquaculture sector on the bay area specifically, however there is not enough published sectoral employment, GDP and wage data. Sufficient data is only available at regional level to produce sub-national impacts.

12. GDP is the main summary indicator of economic activity in Ireland. GDP can be defined as GVA plus taxes on products less subsidies on products. References to economic growth (or when the economy enters recession) typically relate to the rate of change of GDP. All references in this report relate to GVA; also known as GDP at 'basic prices'; and they exclude taxes and subsidies.

THE SURVEY

The industry survey was designed to provide the evidence base from which to estimate the local aquaculture sector's contribution to the regional/national economy. Responses from the sector were analysed according to common characteristics and cross-referenced with the most recent full snapshot of the local aquaculture sector population.[13]

Sample estimates were then 'grossed' up to that of the total population. This was done by drawing on BIM records of the sector population in each bay which contained fields on sub-sector and turnover bands. Knowing indicative turnover levels for the businesses not captured in the survey, we were then able to apply the average ratio of jobs to turnover levels for specific sub-sectors and apply average sectoral wages, etc. In other words, we utilised the industry survey sample and the business specific characteristics of the missing firms to estimate the direct activity not captured during the survey exercise. The resulting aquaculture related turnover estimate is designated to a broad industry sector of the economy ('Agri, forestry and fishing') for modelling later in the analysis.

This turnover figure is essentially the value of output within the local aquaculture sector and encompasses intermediary demand, wages and profits. By utilizing the survey results we were able to devise operating expenses/cost of bought in goods and services (excl. employee costs) for each business within the sector population. By subtracting this from the previous turnover figures we arrived at an estimate of the direct sectoral GVA contributions to GDP in the local economy. Both direct employment and gross wages paid within the local bay aquaculture sector are again informed by the survey findings and grossed to the population total based on shared characteristics.

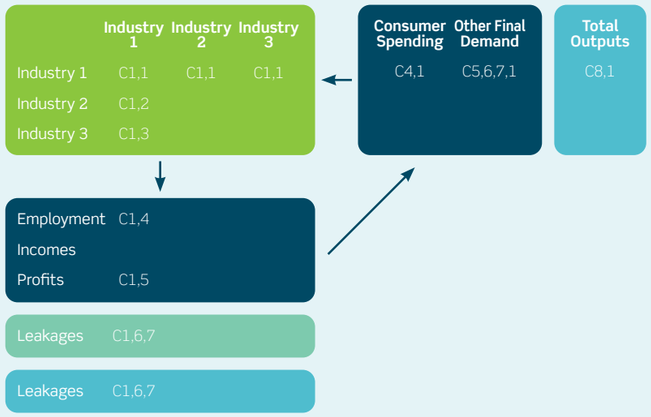
With our estimate of direct output and wages, we then applied sectoral taxation assumptions informed by the CSO's Input-Output framework and calculated the resulting fiscal benefits that would likely be collected by the Revenue Commissioners.

ESTIMATING INDIRECT AND INDUCED IMPACTS

To estimate the indirect and induced impacts we have built an Input-Output model. Figure 16 presents a stylised version (showing just three sectors for presentation purposes) of our Input-Output model which is a model that traces how economic activity flows through an economy as one sector makes purchases from another sector.

13. Originally provided by BIM (via registration and industry census data) but further refined/ updated during the survey phase of the analysis. Turnover bands were also assigned to the known aquaculture population based on returns information where available, and when not, estimated by BIM based on shared characteristics.

Figure 16. Stylised input-output model



We have used the latest Irish input-output tables for the analysis, but have adjusted these in line with academic guidelines (Flegg, A. T. and Tohmo, T. (2013) "Regional input-output tables and the FLQ formula: A case study of Finland") to account for the size and structure of the local economy.[14] The technique involves constructing sub-national input-output models by applying Location Quotients (LQs) and sub-national size adjustments to the standard Ireland Input-Output tables. The result is that geographies with higher concentrations of industries receiving procurement or household expenditure have larger impacts. In addition, we have used information gathered from the survey to further isolate the procurement spend locally, thereby strengthening the overall modelling assumptions.

MODELLING SUPPLY CHAIN IMPACTS

The survey provided us with information on the size of supply chain spending relative to turnover, its allocation to specific parts of the economy/goods/services and its location (local/national/international). Using this information, we were able to construct a more detailed picture of the first round of supply chain spending than the published input-output tables would otherwise provide.[15]

14. Due to data availability, the local aquaculture sector's economic impact can only be localised to the regional level (NUTS 3).

15. Survey respondents with food processing components where asked where they source the inputs for these operations. All noted their own internal aquaculture produce. In the absence of additional information, we have assumed minimal cross over in supply chains between bay producers.

We then used the impact model to estimate all the subsequent rounds of supply chain or indirect spending associated with the local aquaculture sector. The input-output tables provide us with an estimate of indirect output by sector. We then convert this output back into sectoral GVA and into sectoral jobs to provide a range of sectoral impact measurements. Applying average sectoral earnings allowed us to estimate the income effect.

The induced impact is economic activity and employment supported by those directly or indirectly employed spending their income on goods and services in the wider economy. This helps to support jobs in the industries that supply these purchases, and typically includes jobs in retail and leisure outlets, companies producing consumer goods and in a range of service industries. Again, our Input-Output model was used to estimate these induced impacts.

OXFORD ECONOMICS

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March 2022

The modelling and results presented here are based on information provided by third parties, upon which Oxford Economics has relied in producing its report and forecasts in good faith. Any subsequent revision or update of those data will affect the assessments and projections shown.

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