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A Tale of Three Fisheries

The value of the small-scale commercial fishing fleet, aquaculture and the recreational charter boat fleet, to the local economy of Poole

NEW ECONOMICS FOUNDATION

Southern IFCA
Inshore Fisheries and Conservation Authority

Title: A Tale of Three Fisheries: The value of the small scale commercial fishing fleet, aquaculture and the recreational charter boat fleet, to the local economy of Poole

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Executive summary

Coastal communities are performing at a level that is worse than the national average, across a number of key indicators. Despite this, they are located close to unique natural resources, which underpin the potential for generating good jobs and meeting local needs, while also protecting the marine environment. The New Economic Foundation's Blue New Deal[i] sets out a vision for revitalising coastal communities and protecting the natural resources they depend on.

In the case of Poole, Dorset, there are opportunities to improve the three primary direct marine sectors (commercial fishing, aquaculture and charter boat trips) without compromising the health of the marine environment that supports them.

Here we demonstrate that the three sectors generate between them over £12.5 million in total economic activity, as shown in the summary table below.

	Gross Output	Indirect Output	Total Economic Activity
Aquaculture in Poole Harbour	£1,590,000	£1,025,250	£2,615,250
Commercial fisheries (top 11 species)	£2,000,271	£2,177,620	£4,177,891
Charter boat fleet (estimated for 33 vessels)	£3,129,687	£2,600,103	£5,729,790
Total for all three sectors combined	**£6,719,958**	**£5,802,973**	**£12,522,931**

Despite this significant contribution to the economy of Poole, there are both threats and opportunities that decision-makers must consider (at both national government and local authority level), to ensure that these sectors maintain (or even increase) their contribution, without jeopardising the health of the marine environment.

Clear opportunities exist for the **small scale fishing fleet**: by improving the local supply chain through markets on Poole Quay; through local authorities signing up to be Sustainable Fish Cities; and by publicising the success of the recent Marine Stewardship Council (MSC) accreditation for Poole Harbour. Connecting producers and buyers directly, would enable fishers to become price makers rather than price takers; this is an immediate need, which will generate more revenues from the same level of fishing. Sustainability in the local supply chain has improved dramatically, since the Southern Inshore Fisheries and Conservation Authority (IFCA) and the Poole and District Fishermen's Association (PDFA) have now regulated a previously problematic fishery, thereby improving prices, data, sustainability, compliance and management for Poole Harbour. This successful use of regulation has created a 'win-win-win' situation for regulators, fishers and the environment.

Barriers to entry, in terms of access to quota and the certification schemes, remain a problem for the small-scale fleet both locally and nationally. There is a clear risk that fishers may become further marginalised. If coastal development is not mindful of the marine sectors that make a living from the marine resources, then these livelihoods are vulnerable. Uncertainty around the consequences of leaving the European Union, and the outcomes of the ongoing Brexit negotiations, continues to hamper effective planning for the future.

For the **charter fleet**, an opportunity exists for the council and tourist board to develop a charter angling strategy and a best-practice code of conduct that involves local operators and regulators. However, since angling is not taken account of in planning policy (although it is clearly an economic driver), there is a risk that this local asset may not be encouraged and developed in a coordinated and sustainable manner.

For **aquaculture** and the shellfish fishery in the harbour, the Poole Harbour Fishery Order 2015 enables a re-laying model for fattening shellfish and matching supply to demand. This ensures seasonal stability and access to markets throughout the year, as well as providing an opportunity to improve price, and provide stability of supply rather than gluts, while increasing the spawning stock within the harbour for clams and cockles. In this manner, it becomes possible to increase fishery production, within sustainable limits.

Part one - Introduction: A 'Blue New Deal' for Poole Harbour

The New Economics Foundation's Blue New Deal[ii] sets out a vision for revitalising coastal communities and protecting the natural resources they depend on. Balancing the economic and social needs of communities with the sustainability of the marine environment is a key challenge: the goal being to ensure that both environments return to prosperity and become resilient. The UK coast and seas are societal assets, and the Blue New Deal action plan to restore coastal communities and marine ecology shows that improving the marine environment and economy are not mutually exclusive; indeed, the opportunity exists for them to enhance each other.

Previous research[iii] has highlighted the untapped potential of the UK's natural resources. From the outcomes it is clear that a healthier marine environment is able to support employment, increase resilience to economic and environmental challenges, provide sustainable sources of food and energy, and also increase wellbeing, alongside healthier lifestyles.

Previous research[iv] also highlighted that unemployment is higher in coastal communities, as are levels of insolvency; while health and education are below the national average.

The UK Marine Policy Statement sets out a vision for, 'clean, healthy, safe, productive and biologically diverse oceans and seas'.[v] In 2012, the UK Government's Coastal Communities Fund (CCF) was launched to support, 'coastal communities that are able to use their assets (physical, natural, social, economic and cultural) to promote sustainable economic growth and jobs'. To deliver these goals – healthy oceans and seas, and more prosperous coastal communities – we need to consider the local economic contribution of different sectors of the maritime economy, and their respective impacts on the natural resource base that underpins their economic activity. It is within this context that this research is situated: looking at the local economic contribution to Poole of both its commercial fishery (the small scale, coastal 'inshore' fleet or 'under tens') and the recreational fishery (represented by the local charter boat fleet).

Fishing is an important economic activity, producing food, employment and revenue for coastal communities, while also giving a unique identity to those communities with a strong fishing heritage. While the fishing industry is seen as a relatively small sector within the UK economy (0.03% of GDP), the significance of the inshore fleet for coastal communities is much greater. Over 99% of fish, landed by vessels of under 10-metres, goes to UK ports – although the final destination of the catch is frequently overseas. These first landings support a diverse supply chain that includes vessel maintenance services, fish processing,

fish-and-chip shops, food markets and restaurants; while also creating social and cultural value, by attracting tourists and providing a sense of identity to local people.

Fish landings have declined since the 1940s, with the sector making a smaller contribution to the economy and providing fewer jobs over time. Currently, the UK fishing industry employs about one-third of the number of fishers it employed forty years ago, with around 12,000 in the catching sector currently. The impact of this decline is even greater when the wider supply chain and associated businesses are considered – such as fish processing services, fish-and-chip shops, food markets, and restaurants. While the average UK adult currently eats more fish than the previous generation, there is also greater dependency on seafood imports.[vi] If, however, all UK fish stocks[vii] were restored to levels capable of producing their Maximum Sustainable Yield (MSY) and, if fishing quotas were fairly allocated (See Box 1), an additional 457,000 tonnes of fish could be landed per year, adding £268 million GVA (Gross Value Added) to the UK economy; with an increase in employment of 24% – the equivalent of 4,922 new jobs.[viii] It is beyond doubt that sustainable fisheries make economic sense.

Inshore fishing in Dorset

Dorset is a county on the south coast of England that is home to numerous fishing towns and villages, and which attracts visitors from around the world. The harbours remain as hubs of activity within communities, though the fishing industry has had to adapt over the years, to the available fish quotas, the state of key stocks, and changes in national and export demand. The Dorset coastline is rich in environmental designations (terrestrial and marine protected areas) and the local, small-scale, inshore fleet prides itself on using low-impact fishing techniques. (As the fleet uses mainly pots and nets, or rod and line fishing, the associated impact on non-target species and the wider environment is considerably lower than caused by large-scale, heavy, towed gear such as beam trawls or scallop dredges). Although uncoordinated in their approach, numerous fishing associations exist in the area. Fishing boats in Dorset are predominately under 10 metres in length, although there are also some larger vessels in the area.[ix] Inshore fisheries (0-6 miles from shore) are managed by the Southern Inshore Fisheries and Conservation Authority (IFCA) in Dorset. The inshore fleet is also managed and administered by the Marine Management Organisation (MMO). The MMO administers inshore fishing vessels licensing and quotas, in accordance with government policies set by the Department for Environment, Food and Rural Affairs (Defra).

Box 1: The UK fishing quota system

The current UK system for distributing fishing quotas (fishing rights), known as Fixed Quota Allocations (FQAs) has left inshore fishers (with boats under 10 metres in length) struggling to maintain their businesses and remain economically viable. Despite supporting the majority of jobs in the fishing industry and representing 77% of vessels, the inshore

fishing fleet receives only 1.5% of the share of fishing rights for quota species (FQAs by tonnage), when compared to boats over 10-metres. While the gross profit margin for the large-scale fleet has reached a historic high of over 25% recently, the small-scale fleet is plagued by low profit margins. In addition, most inshore vessels are not represented by Fish Producer Organisations (POs).[x] Small-scale fishers have been mostly excluded from membership, which has effectively distanced them from much of the decision-making concerned with fisheries management. This context of the exclusion and unequal distribution of fishing opportunities has led to two negative environmental outcomes:

- With less access to the fishing quota, inshore fishers exert higher pressure on non-quota fish species, which can lead to over-fishing.
- It has also led to the wasteful practice of discarding fish, as fishers return over-quota catches to the sea, whether dead or alive, as they do not have the rights to land them.

A rebalancing of the quota would benefit many coastal communities. While 300 ports in the UK facilitate more than £44,000 in landings, more than 50% of the value is landed via the 10 largest ports and 75% of the value is landed via the 30 largest ports. Since small-scale vessels tend to fish out of small ports, a rebalancing of quota from large to small vessels would result in a similar shift in port activity and increased landings in the majority of UK ports.

Poole: local context and environment

Poole is a major conurbation in Dorset, and a tourism hot spot that boasts some of the UK's finest 'blue flag' beaches (the Sandbanks peninsula alone features 23; more than any other beach in the UK). It is also home to the second largest natural harbour in the world (after Sydney, Australia). Poole Harbour (see Box 2 below) is a highly protected marine area with a diversity of nationally important wildlife and fish and shellfish species, and with a national and international reputation. It has been designated as an area of environmental importance (classified as a Site of Specific Scientific Interest, Area of Outstanding Natural Beauty, and EU Special Protection Area[xi]) and is also recognised by having engaged stakeholders (for example, in the Marine Conservation Zone planning process). The harbour is of ecological, recreational and commercial importance to residents and visitors alike, with Ramsar (wetland), SSSI, Special Protection Area (SPA) and Special Area of Conservation (SAC) designations. Nearby is the Studland to Portland SAC (designated under the Habitats Directive) and the Poole Rocks Marine Conservation Zone (MCZ) designated under the Marine and Coastal Access Act, 2009. The town of Poole contains a number of historic maritime listed buildings and it is located within a few miles of the Jurassic Coast World Heritage Site, the New Forest and the Purbeck Hills.[xii]

Major focal points for Poole Borough Council are the conserving, enhancing and promoting of Dorset's special natural and cultural assets, through a Conservation Area enhancement programme; local celebrations of Poole's maritime heritage; and improving the connectivity

between natural areas.[xiii] There is a reliance on tourism in Poole and Purbeck, attracting 2.08m and 2.01m visits respectively, per annum and accounting for £286.35m (23%) of the total direct visitor spent in Dorset in 2012.

As competition for space intensifies in the region, so commercial Fishing, recreational angling and aquaculture production are 'squeezed' by coastal development needs. Property developers, in particular, prize waterside access for recreational amenities (marinas) and the immediate hinterland for housing. Poole Harbour and Poole Bay are considered attractive places to live and tourism is significant, consequently they are busy places and local decision-making needs to consider the social, economic and environmental value generated by key marine sectors (Image A).

Image A: Fishermen's Quay in Poole Harbour

Part two: Poole's local economy

Demographics

The Borough of Poole's population is around 147,600 and most residents work in the 'wholesale and retail' sector. Poole has more 'very affluent' people than the average for England, though there are wide disparities locally between the least and the most well-off, causing a growing inequality gap. In parallel to the marked variation between socio-economic groups, the Borough of Poole comprises of distinct residential zones that are occupied by people from similar backgrounds and income level.

As in the rest of England, Poole is currently experiencing a sharp economic decline, following many years of growth. Unemployment is rising, but is still below the national average. Wage and salary levels are lower than the average for the Southern England, while house prices are relatively high in comparison (due to its attractiveness to retirees). This high ratio of house prices to earnings presents an obstacle for young people trying to enter the property market.

While the area is mainly affluent, the distribution of wealth and living standards in Poole are polarised; there are pockets of deprivation. The Index of Multiple Deprivation 2010 (IMD) identifies that of the 91 Lower Super Output Areas (LSOA) in Poole, 5 are in the worst 25% nationally. There are two acute areas of deprivation, in Hamworthy West and in Poole Town, both of which rank in the worst 10% nationally.[xiv]

In terms of the population in the immediate area, the Purbeck peninsula is mainly rural, whereas the town of Poole is urban and has a notably older population (Figure 1). In terms of population density there is an unequal split either side of Poole Harbour, with the Purbeck peninsula to the south (0-9 person per hectare), and the town of Poole to the north (9-46 person per hectare). The demographic imbalance between elderly and young people results in a smaller population of people of working age in the town of Poole than the national average. The higher proportions of those experiencing income deprivation and education deprivation are found in Swanage, Wareham and west Poole.[xv]

Education, skills and training deprivation are the more widespread forms of deprivation in Poole. A shortage of skills across the area impacts the performance of the local economy.

Coastal areas are becoming cold-spots for social mobility. Poole is among the worst-performing 20% of local authorities in England for social mobility, and one of the worst towns on the south coast of England in the same regard.[xvi]

Employees living in the area earn 10% less than their national counterparts. The median full-time hourly pay for residents is 91% of the average for Great Britain: that is, £11.87 rather than £13.08.[xvii]

Figure 1: Poole, Poole Harbour, Purbeck (red outline) and Bournemouth. Source: Google maps

Employment

Poole is characterised by a high proportion of small and medium enterprises (SMEs), with the majority having a turnover of less than £250k and/or employing fewer than five employees. The Poole economy is not overly reliant on any one sector, but those contributing most to the local economy in terms of Gross Value Added (GVA) are: manufacturing (£0.55bn); finance and insurance (£0.5bn); construction (£0.26bn); and health (£0.21bn). There were 9,800 self-employed residents in Poole according to the 2014 local development strategy.[xviii] The region sits on the edge of the UK's most significant cluster of marine businesses, a manufacturing cluster into Dorset and Wiltshire, and a knowledge-intensive services cluster along the south coast.

Poole is a busy ferry port with a daily roll-on-roll-off service to Cherbourg in France and a fast ferry to the Channel Islands. The Port of Poole is a major trust port making a significant contribution of approximately £53 million, to the local and regional economy. Poole Harbour Commissioners (PHC) directly employs 90 people, with 450 people employed on the Port estate in total. The Port is responsible for many thousands of additional jobs within Poole, Dorset and the South West, as well as providing an essential link to other regions of the UK.[xix]

Poole has a slightly lower than UK average percentage of employees working in low-paid sectors, including: agriculture, forestry and fishing; distribution; accommodation and food service; health and social care; some manufacturing sectors; culture and recreation, among

others (Table 1). In 2011 the Environmental Goods and Services (EGS, latest data) sector contributed 1.5% of employment in Poole.[xx]

Table 1: Industry, employed residents aged 16-74 in Poole, 2011.

Industry	Number	Percent
Wholesale and retail	12,080	16.8
Health	9,708	13.5
Manufacturing	8,056	11.2
Construction	6,105	8.5
Education	5,983	8.3
Financial and insurance	4,653	6.5
Public administration and defence	3,758	5.2
Professional, scientific and technical	3,647	5.1
Other	3,584	5.0
Accommodation and food	3,579	5.0
Administrative and support services	3,151	4.4
Transport and storage	2,901	4.0
Information and communication	2,175	3.0
Real estate activities	1,276	1.8
Water supply, sewerage etc	578	0.8
Electricity, gas, etc	242	0.3
Agriculture, forestry and fishing	**128**	**0.2**
Mining and quarrying	105	0.1
Total	**71,709**	**100.0**

A relatively low proportion of residents in the Poole area claim Employment and Support Allowance (ESA) or Incapacity Benefit (4430 or 4.9% in May 2014); lower than the UK average (5.6%).[xxi]

In terms of seafood, there are a number of restaurants and fish and chip shops in the local area (although these buy mainly from wholesalers: the frozen market especially, for haddock; and larger industrial fisheries for cod). There are also a number of wholesalers and fish merchants that are listed in Table 2.

Table 2: List of restaurants, fish and chip shops, local and regional wholesalers

Restaurants	Fish and chip shops	Wholesalers and fish merchants
Jenkins & Sons	Nick The Fish	Frank Greenslade Ltd
Loch Fyne Seafood & Grill Restaurant	Lakeside Fish & Chips	Dorset Oysters
Rick Stein, Sandbanks	Harlees Fish & Chips	Sea Fresh Seafoods

Shell Bay Seafood Restaurant	T J's Fish & Chips	Samways
Isabel's	Chez Fred	Dorset Shellfish Company
Storm Fish Restaurant	Daniels Fish and Chip	Cove Shellfish Ltd
Da Vinci's	Halfway Fish Bar	
Poole Arms	Parkway Fish Bar	**Regional buyers**
Seaview Restaurant	Sailors Fish & Chips	Viviers
WestBeach	Oakdale Fisheries	Direct Seafoods
Guildhall Tavern	Long John's Fish and Chips	Samways
The Point Restaurant		
Crab at Bournemouth		

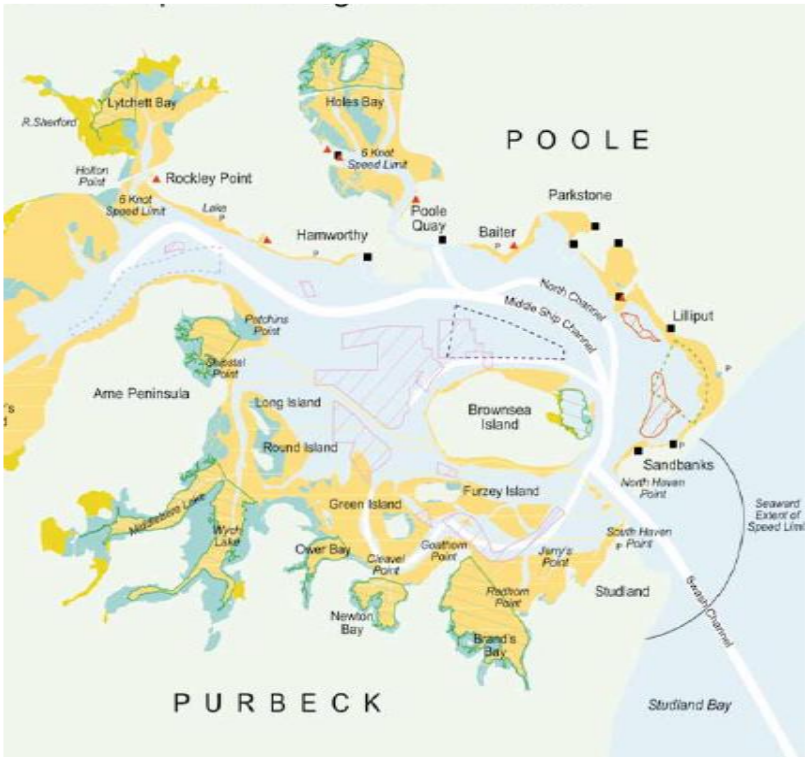
Box 2: About Poole Harbour

Poole Harbour (Figure 2) is the largest natural harbour in the EU and Poole is a major cargo and transportation port, as well as being a popular tourist destination, but Poole Harbour and Poole Bay are also significant sites for nature conservation. Poole Harbour is designated a Special Protection Area (SPA) under the Birds Directive, and is also a Site of Specific Scientific Interest (SSSI). Sightseeing vessels operate from Poole Quay to Brownsea Island and around the other islands in the harbour. Cruises also operate along the Jurassic Coast and up the channel to Wareham. One of Europe's largest on-shore oilfields lies beneath Poole Harbour and Poole Bay.

Poole Harbour Commissioners (PHC) are responsible for conservancy and protection of the harbour, improving water and air quality, reducing noise pollution, improving marine safety, recreation and tourism as well as cultural heritage. They also drafted the Poole Harbour Aquatic Management Plan (PHAMP) and run the associated steering group.[xxii]

The reformed Common Fisheries Policy (2013) integrated fisheries and environmental policies. The Poole Harbour Special Protected Area (SPA), the Poole Bay Marine Conservation Zone (MCZ) and the Studland to Portland Special Area of Conservation (SAC) designations mean that the fisheries within these areas are subject to fisheries and Habitats Regulation Assessment. Through these assessments, there is an ongoing need to coordinate management of the fisheries to ensure the conservation objectives for the sites are achieved, and undesirable environmental impacts are avoided.

Figure 2: Detailed chart of Poole Harbour[xxiii]



Source PHAMP (2011)

Box 3: UK Aquaculture

Aquaculture is one of the world's fastest growing food sectors, in part because of over-fishing and the growing global demand for a source of protein. The majority of the fish we consume today is farmed rather than wild-caught. In terms of value, the UK is now the largest aquaculture producer in the EU; Scottish Atlantic salmon is by far the most valuable product. Most of the jobs in aquaculture in England, Wales, and Northern Ireland are associated with small businesses that focus on meeting a relatively local demand.

The UK has ideal, natural conditions to support shellfish aquaculture (including the farming of oysters, mussels, scallops, and clams, which can be farmed using various techniques). The shellfish sector already contributes around £35.6 million annually to the UK economy (2016)[xxiv]. Contrary to many types of fin-fish aquaculture, shellfish and seaweed farming do not require feed or fertilizer inputs, nor insecticides or antibiotics, meaning that these practices can deliver environmental benefits, such as water filtration,[xxv] or food for wading birds, without any inputs. Shellfish aquaculture is especially dependent on good water quality. Despite the potential for shellfish aquaculture in England, the sector is underdeveloped in comparison to France.

Water management in many parts of the UK suffers from a lack of coordination and clarity over governance and financial responsibility. For example, in some areas, the local authority might lack the resources to cover the cost of water treatment, and water companies or businesses might not have legal responsibility for covering the costs of agricultural pollution

or sewage (with combined sewer overflows being a significant issue for shellfish farming). As a result, waste generated inland ends up polluting estuaries and the marine environment, affecting water quality negatively, and constraining the development of shellfish aquaculture.[xxvi] Regulating Orders allow the management rights to designated natural shellfisheries, to be allocated usually to a public authority – to enable inshore shellfish management and encourage collaboration and community involvement. Inshore Fisheries and Conservation Authorities (IFCAs) in England are already taking the lead on this and are developing their own aquaculture strategy to help address competition for space. There is a lack of strategic coordination by central government however, and no funding is provided to local managers to support growth.

Part three: Sectors considered for this research

There are three main extractive marine industries of note in the Poole region when it comes to the local marine environment:

1. Aquaculture (the growing of bivalve shellfish)
2. The small-scale commercial fishery (targeting both fin-fish and shellfish)
3. The recreational (charter boat) fishery, which target fin-fish such as bass, plaice or cod.

Aquaculture in Poole Harbour

Aquaculture (described in Box 3 above for the UK as a whole) is a major activity in Poole Harbour, focussed on bivalve shellfish. The main species grown are oysters (both pacific and native), clams (both *mercenaria* and *manila*), mussels and cockles.

Today Poole Harbour is the largest pacific oyster production area in England. Pacific oyster (*Crassostrea gigas)* production in Poole ranges between 300 and 400 tonnes per year; mussel (*Mytilus edulis)* production for the financial year 2014/15 was 262,536 kg. Total aquaculture (including clam and cockle) production for Poole Harbour for 2014/15 was 700,000 kg, when oyster landings contributed around 270 tonnes of the total.

The Poole Harbour Fishery Order 2015 (a Several Order) covers an area of circa 838 hectares. Presently, less than one quarter of this area is under aquaculture production. With careful management, this can be increased to improve the economic output.[xxvii] The Poole Harbour Fishery Order 2015, grants Southern IFCA the opportunity to lease ground for aquaculture. The ability to do so has been in place since 1915. As of 2015, Orders are granted for a period of 20 years, enabling long term planning for the industry. There are currently 31 beds leased within the extent of the Order.[xxviii]

Commercial aquaculture species cultivated in Poole Harbour

The Pacific oyster (*Crassostrea* /now *Magallana gigas*)

Introduced into British waters in 1890, the Pacific oyster was intended to support an industry suffering from the decline of the Native oyster (Britain was thought to contain Europe's richest natural oyster beds, generating revenues and employment including hundreds of fishers and vessels).[xxix] The dramatic decline in the native oysters provided a need for importing oyster seeds to grow-on in the UK and these included the non-indigenous American oyster (*Crassostrea virginica*) and the Portuguese oyster (*Crassostrea angulata*).[xxx] The Pacific oyster was introduced into Poole Harbour in 1890, leading to the

establishment of self-sustaining populations, meaning the species is effectively naturalised (this is part of an ongoing debate about what constitutes a 'native' species).[xxxi]

Given the global market for oysters, especially in China it is clear that British Pacific oyster production could be significantly increased, delivering socio-economic benefits for Poole and its local economy. The growth of bivalve shellfish aquaculture is important for marine planning and is a key area promoted in the Blue New Deal action plan (2016).[xxxii]

Mussels (*Mytilus edulis*)

The common or blue mussel is the common name for a number of species of the family *Mytilidae*, of which *Mytilus edulis* is the species most common in UK waters. In Poole Harbour, all mussels are produced under the Poole Harbour Fishery Order 2015, and stocks are managed by SIFCA. Private operators manage 'lays' which are leased areas for growing-on seed mussels that have been collected from elsewhere (usually from open water along the Dorset coast). Management aims for compliance within the conservation objectives for European Marine Sites.[xxxiii]

Native oyster (*Ostea edulis***)**

The European flat oyster (*Ostrea edulis*) is classified as highly endangered throughout the EU and stocks are currently severely depleted compared to its historic abundance.[xxxiv] The decline is attributed to a combination of habitat destruction, disease mortality, water quality, fishing, and the interplay between these factors.

Hard-shell clams (*Mercenaria mercenaria*)

The hard-shell clam, *Mercenaria mercenaria* originates from the east coast of North America and was purposefully introduced into Southampton waters in 1925. Dumping and deliberate introduction attempts, as well as natural larval dispersal, are all thought to be the reasons for the species' current occurrence in Poole Harbour. American hard-shell clams were first targeted as a commercial prospect in the 1970s, whereas historically, the species had been a 'boom and bust' fishery. The clams are sought in their own right, and are also retained as a bycatch species when fishing for Manila clams (described below). The species is harvested in the Pacific oyster aquaculture beds within Poole Harbour, using oyster barges.[xxxv]

Manila clams (*Venerupis philippinarum syn. Ruditapes philippinarum*)

The Manila clam (*Ruditapes philippinarum*)[xxxvi] is one of the top five, most commercially valuable, bivalve species globally, but is also found within the protected site of Poole Harbour. The Manila clam was first introduced into Britain in 1986 by the UK government's Ministry of Agriculture, Fisheries and Food (MAFF). It was assumed that the species would not naturalise, owing to water temperature restricting their reproduction; however, this proved to be incorrect. Extensive naturalised populations are now found in Poole Harbour, the Solent and other English estuaries. Manila clams live buried in coastal sediments and are

well-adapted to estuarine habitats, such as the mudflats of Poole Harbour. Although they are naturalised, and play a significant role in the food chain, they do not appear to be aggressively invasive.

Cockles (*Cerastoderma edule*)

The common cockle, *Cerastoderma edule* is indigenous to UK waters and is widely distributed in estuaries and sandy bays. The species is retained predominantly as a bycatch when fishing for other bivalve species, namely Manila clam, although it can be targeted in its own right. The species is harvested from Pacific oyster and clam aquaculture beds. In Poole Harbour the *pump-scoop dredge* method is used for harvesting cockles. The injection of water from the pump may also be directed into the seabed when fishing for cockle, due to the sandy sediment habitat.

Aquaculture and the national / local economy

The two most significant species for aquaculture in Poole Harbour are mussels and oysters, followed by clams.

Currently it is assumed that 67% of UK Pacific oyster production is exported from the UK. Pacific oysters now have an economic significance UK-wide, represented by Gross Output and Gross Value Added (GVA) through all stages of the value chain. Using 2011/12 market prices, the value has been estimated at £13 million (Annual Gross Output, being 5 times the first sale value), and over £10 million Gross Value Added (GVA) for total UK production.[xxxvii]

To estimate the economic activity for aquaculture harvesting in Poole Harbour, a model was used that had been previously developed in the context of harvesting shellfish, in the Solent.[xxxviii] This model estimated Gross Output, defined as the direct economic turnover generated from shellfish aquaculture. Here, gross output relates to the turnover received by aquaculturists, when selling their catch upon landing. Indirect Output represents the expenditure in other parts of the aquaculture supply chain that occurs as a consequence of shellfish harvesting. In the shellfish harvesting model, these measures include the economic benefits from depuration processes, boat and machinery maintenance, transportation, shellfish wholesalers and local shellfish retailers. Total economic activity equals the sum of Gross Output and Indirect Output. How each measure was calculated, the data used and the assumptions behind them are now discussed.

Calculating Gross Output

Figures for the annual harvest sizes for oysters and mussels, the landing price, and the percentage of landings sold locally or exported, were obtained through discussions with local oyster and mussel harvesters in Poole. Average annual landings were estimated at 350 tonnes for oysters, while the average landing price was estimated at 30p per oyster. This works out

at £2.40 kg if the average oyster mass is assumed to be 125g. The percentage of the landings sold locally was estimated to be 15%, with 85% exported. Mussel landings for Poole Harbour were estimated at an average of 500 tonnes per annum. Although their value per kg differs, both are considered together in the calculations below.

Using this data, gross output is calculated by multiplying the total harvest size from Poole's aquaculture beds, by the proportion of the harvest size sold either locally or exported.[xxxix] The assumptions and figures were informed by discussions with producers, in July 2018.

Gross Output = (Total Harvest Size x Proportion of Harvest Size sold locally x Local Landing Price) + (Total Harvest Size x Proportion of Harvest Size exported x Exported Landing Price)

Calculating Indirect Output

Five indirect beneficiaries from shellfish aquaculture harvesting are identified in the model: shellfish depuration processers, boat and machinery maintenance workers, shellfish wholesalers, local shellfish retailers and shellfish transporters. Using a combination of values and proxies, the economic benefits for each were calculated. When aggregated, they represent the indirect output generated by Poole Harbour's Pacific oyster harvest. Table 3 presents the calculations used to determine indirect output. The values and proxies used in these calculations are found in Table 4.

Table 3: Indirect Output calculations

Indirect beneficiaries	**Calculation**	**Relevant proxies /values**		
		Description	**Value**	**Unit**
Shellfish depuration processers	Cost of processing per shellfish x Number of shellfish	Cost of depuration (purification) per shellfish	0.05	£
		Average mass of shellfish	0.100 – 0.125	kg
Boat and machinery maintenance workers	Annual maintenance costs for boats, machinery and tools per shellfish dredger x Number of shellfish dredgers	Annual maintenance costs for boats, machinery and tools per shellfish dredger	35,000	£
		Number of shellfish dredgers	3	#
Shellfish wholesalers	% of shellfish to local market x total harvest size x price paid by wholesalers - % of shellfish to local market x total harvest x price paid to fishermen	Wholesale price per shellfish	2.50-4.64	£

Local shellfish retailers	% of shellfish to local market x total harvest size x price paid by end users - % of shellfish to local market x total harvest x price paid to fishermen	Retail price per shellfish	3.0-17.60	£
Shellfish transporters	% of harvest exported x Harvest size x Transportation costs by lorry freight (to France) X % of shellfish to export market	Transportation costs by lorry freight (to France)	0.10	£/kg

Table 4: Economic activity calculations for aquaculture

Impact scope	Impact	Economic value	Calculation
Gross Output	Aquaculture earnings	£1,590,000	Total catch X price paid to fishermen
	Gross Output Total	***£1,590,000***	
Indirect Output	Depuration processors	£42,500	Cost of processing per shellfish X number of shellfish
	Boat, equipment, processing maintenance	£105,000	Annual maintenance costs for boats, machinery and tools per shellfish dredger x Number of shellfish dredgers
	Wholesalers profit (local, domestic and foreign export)	£117,600	(% of shellfish to local market X total harvest X price paid by wholesalers) - (% of shellfish to local market X total harvest X price paid to fishermen)
	Local retailer profit	£680,400	(% of shellfish to local market X total harvest X price paid by end users) - (% of shellfish to local market X total harvest X price paid to wholesalers)
	Transport of shellfish to end user	£79,750	% of harvest exported x Harvest size x Transportation costs by lorry freight (to France) x % of shellfish to export market
	Indirect Output Total	***£1,025,250***	
	Total Economic Activity	**£2,615,250**	

The small scale commercial fishery: Fisheries in decline

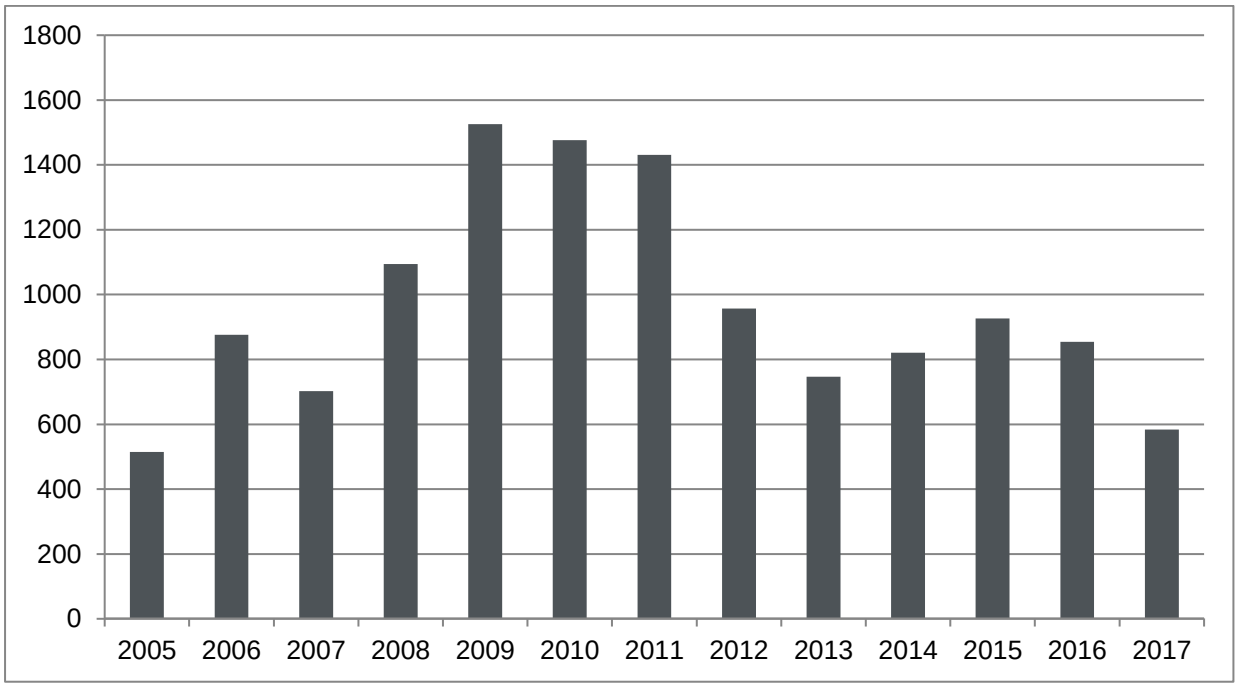
Although known for its fisheries heritage (in particular the sprat and native oyster fishery), fisheries in Poole have been declining over the past decade. This has a number of causes, including quotas (as described in Box 1) and licences, which had a significant effect on the fishermen in Poole when they were introduced in the early 1990s.[xl] As a consequence, a number of fishermen sold up and moved out of the industry, while others diversified into aquaculture or took up charter angling trips on a full-time basis.

The local fishing industry has declined in recent years, due to multiple factors, including the lack of young people joining the sector; competition from larger vessels; the sector not being seen as economically viable due to high start-up costs; and increased regulatory processes surrounding access to quota and discarding.

Poole is the third largest port for landings in SIFCA district[xli] (landing 583 tonnes in 2017, worth £1.6 million). Landings from the Poole Harbour fishing fleet have halved since 2010, as shown in Figure 3.

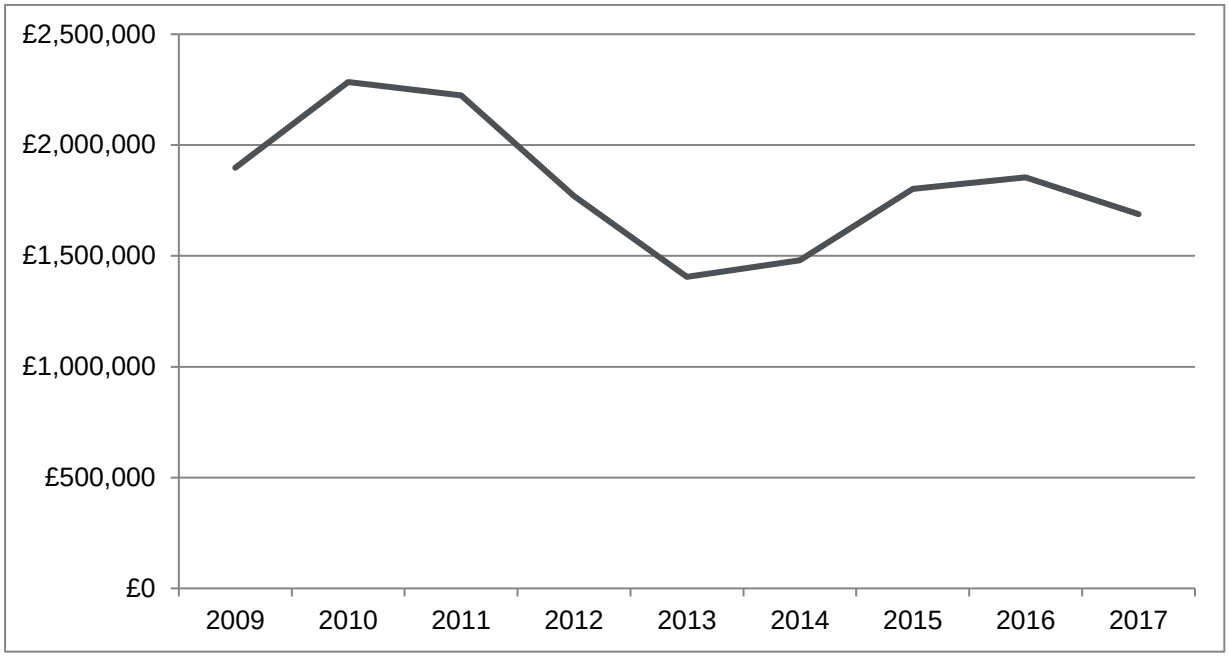
Figures 4 and 5 show a clearly decreasing trend in both volume and value during recent years. In terms of the main species: plaice, sole, and bass are the main catch for fin-fish. In terms of shellfish: whelks, cockles and clams comprise the main species landed. The Manila clam fishery, whelks and the brown crab potting fishery now comprise the major wild fisheries by landed value.

Figure 3: Landings into Poole (tonnes) 2005-2017



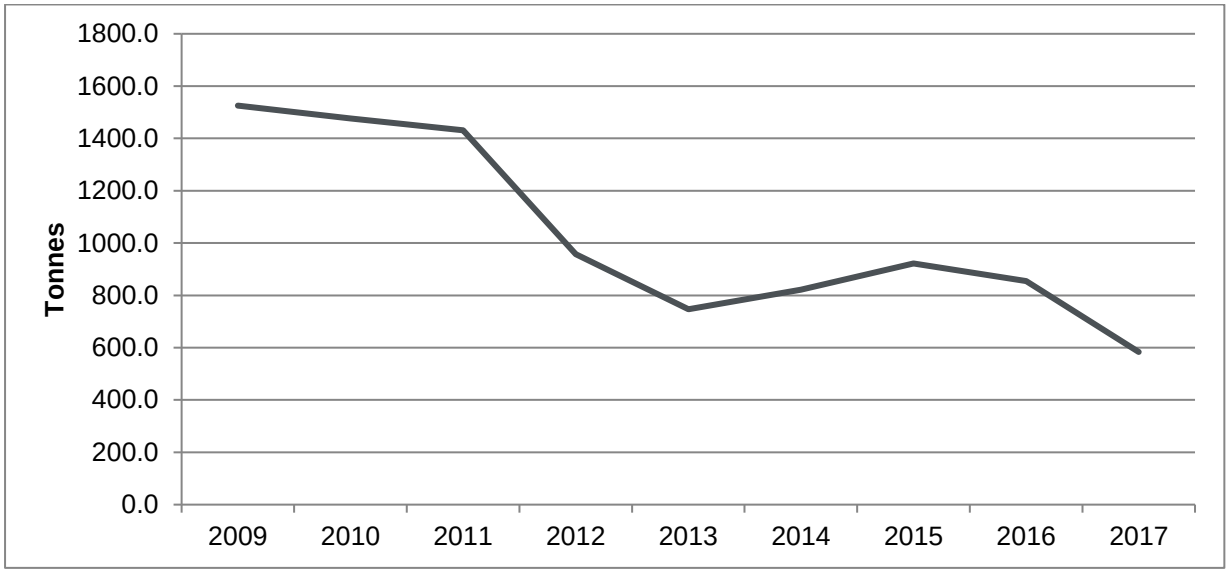
Source: MMO data

Figure 4: Landings into Poole (value, £GBP) 2009-2017.



Source: MMO data

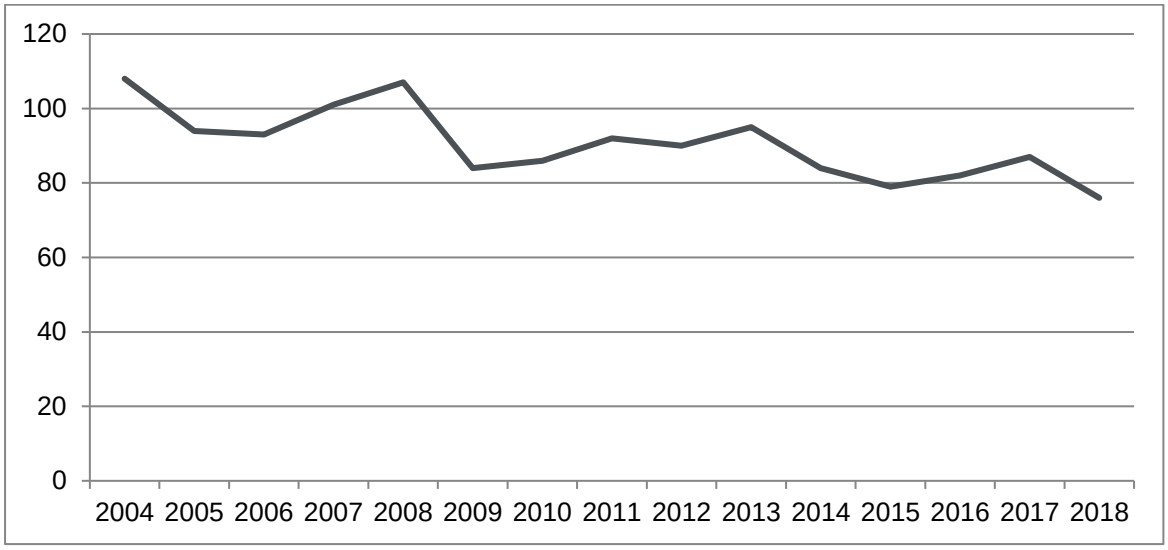
Figure 5: Landings into Poole (live weight, tonnes) 2009-2017



Source: MMO data

There are currently around 100 active fishermen in the Poole Harbour area. Poole and District Fishermen's Association (PDFA) membership includes full time commercial fishermen, aquaculture owners and charter skippers.[xlii] There are 76 commercial fishing vessels operating from Poole Harbour (registered in Poole although a small number of these are currently unlicensed).[xliii] An average length of 6-metres for the fleet means the fleet is considered very small-scale (Figures 6, 7 and 8).

Figure 6: Total number of registered vessels in the Poole Harbour fleet (2004-2018): including licensed and unlicensed vessels

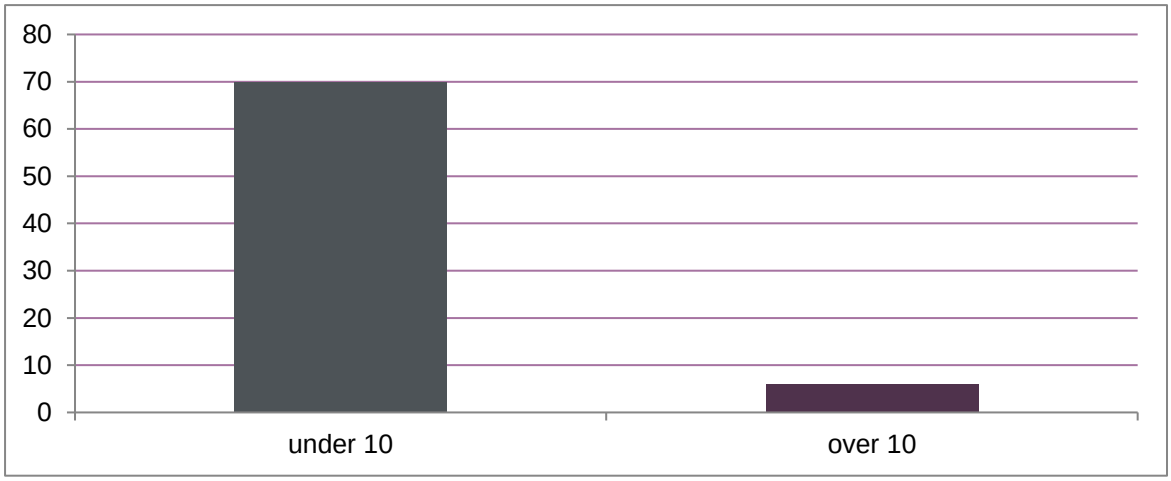


Source: MMO data

Figure 7: Breakdown of over 10-metre and under 10-metre vessels (2004-2018)

Source: MMO data

Figure 8: 2018 breakdown of over and under 10-metre vessels in Poole



Source: MMO data

The Manila clam fishery forms the basis of the largest production area of this wild fishery in the UK. Live, landed weight, has decreased by nearly 50% during the past 6 years, while the value of landings has decreased by 25% since 2010. *It is worth noting a major discrepancy between MMO data and SIFCA data concerning the manila clam landings. For our local economic impact calculations by species, presented below in Table 7, we have used SIFCA data as it is deemed more accurate and collected quayside.*

A little more than half of the vessels engage in the clam and cockle fishery, while the majority of the fleet uses static nets and pots to catch crab, lobster, sole, plaice, bass, mullet and whelks. The main species harvested (whelks and farmed Pacific oysters and clams) are exported.

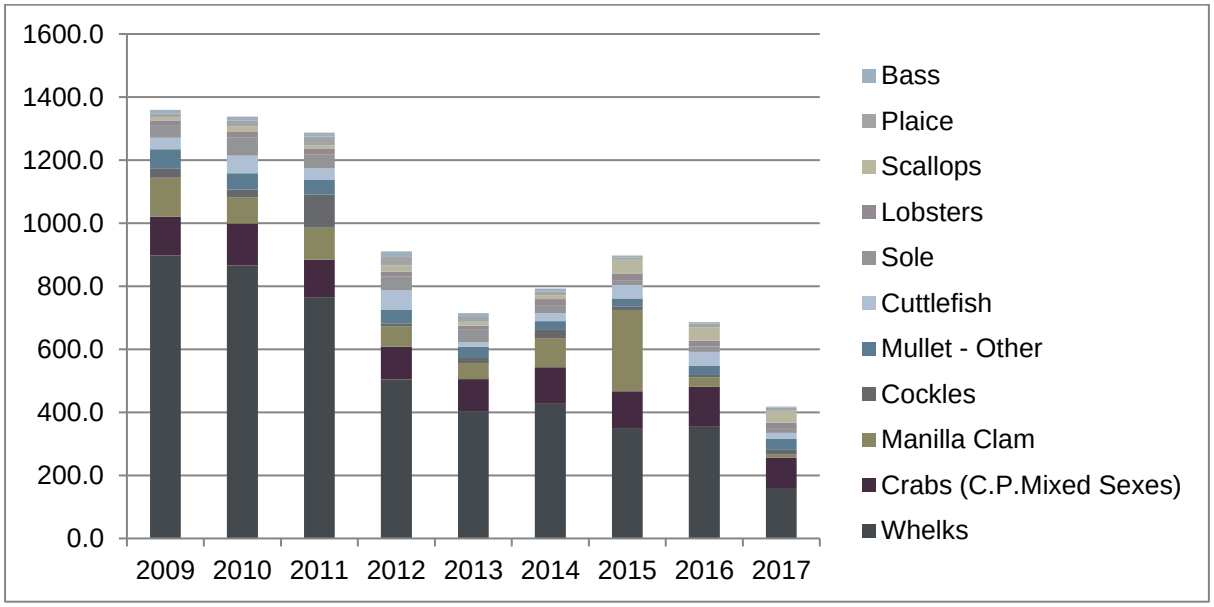
As shown in Table 5 and Figure 9 below, whelks represent the major landing in terms of weight, followed by brown crab and scallops. Whelks are exported to South Korea, and the other main species are consumed locally, nationally and exported; the exact percentage of each varies according to the quantity that each individual vessel lands (and therefore whether they choose to transport their catch to another port and market, such as Plymouth or Brixham).

Table 5: Top 10 species by landed weight in Poole, 2017

1	Whelks	6	Lobsters
2	Crabs	7	Cockles
3	Scallops	8	Sole
4	Mullet	9	Plaice
5	Cuttlefish	10	Manila clam

Source: MMO data

Figure 9: Landings into Poole by top species (tonnes) 2009-2017

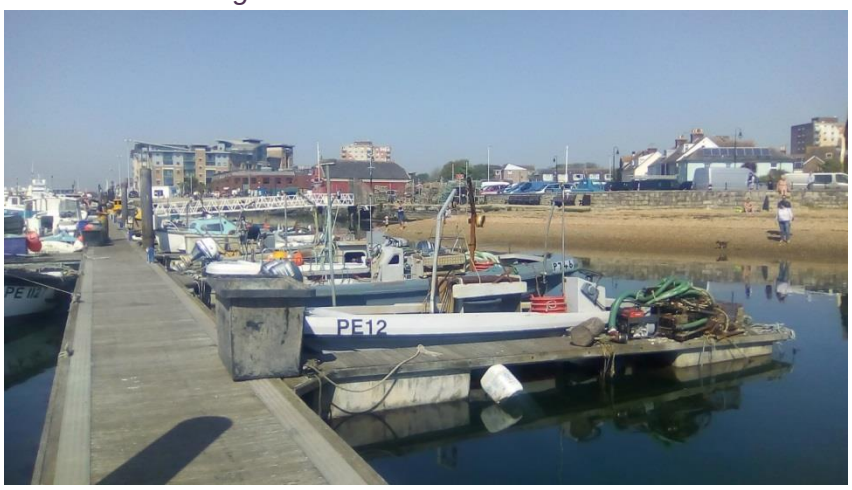


Source: MMO data

Since 2012, the Sustainable Food City Partnership, for Bournemouth and Poole, has been campaigning to raise understanding and awareness of the need for local organisations, businesses and consumers to source fish and shellfish only from sustainable fisheries. The success of the campaign has led to the area becoming the first Sustainable Fish City in the world.[xliv] The partnership wishes to build on this initial success by working with key geographical locations, to ensure that all relevant businesses have joined the campaign and that they pledge to serve only sustainable fish.

Although there are clear opportunities to promote fisheries products on the back of small-scale sustainable fishery and the high-quality marine environment, the branding and identity of fisheries products are not as well-known as for some other foods. For shellfish especially, the opportunities are clear (for example, the Marine Stewardship Council accreditation of the clam & cockle fishery).[xlv] Image B shows clam and cockle dredge vessels in Poole Harbour.

Image B: Clam and cockle dredge vessels in Poole harbour



Achieving healthy fish stocks by 2020, fished at their Maximum Sustainable Yield (MSY), forms one of the guiding principles of the reformed Common Fisheries Policy. Based on scientific advice from the International Council for Exploration of the Sea (ICES), fishing opportunities and fishing levels must be adjusted to bring exploitation down to levels that maximise yields, in perpetuity. Presently, a number of the 'key stocks' in the Poole area are not subject to stock assessments (in terms of their economic value: for example, for clams, cockles, whelks and lobster). In consequence, it is not possible to assess them against maximum sustainable yield (MSY) criteria.

The lack of reliable stock models to ensure sustainability in harvesting (see earlier point on MSY), frequently represents a barrier along the supply chain, as some consumers (for example the Sustainable Fish City) would need to know whether the fishery was accredited by the Marine Stewardship Council (MSC). One major component of MSC is that the stocks are fished at MSY. Funding the MSC accreditation is problematic for the small-scale fleet operating in the area and this limits their ability to capture more value from the same

amount of fishing and landings, particularly when combined with a number of inherent barriers to their fishing effort (as described above).[xlvi]

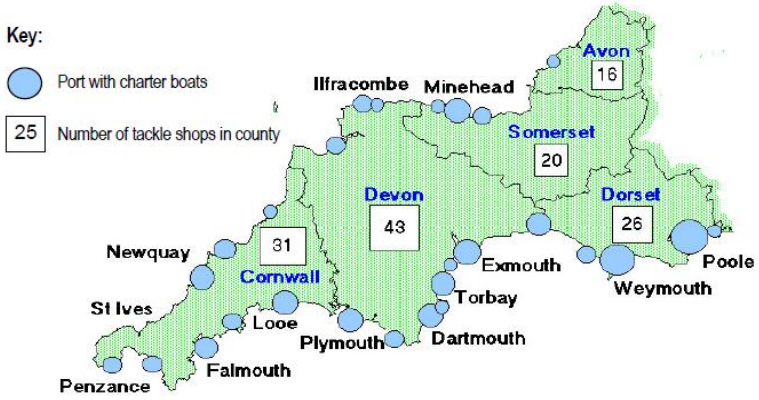
The recreational charter boat fishery

Recreational sea angling by individuals (fishing with a hook and a line for non-commercial purposes) does not require a licence in the UK. Most recreational fisheries operate under a 'regulated open access management' regime, whereby individuals follow fishing gear and catch restrictions (such as the EU Minimum Conservation Reference Sizes) as well as national and local regulations.[xlvii]

According to Defra's *Sea Angling 2012* report,[xlviii] sea angling in England supported £2.1 billion of total spending (considering indirect and induced effects), provided a total of over 23,600 jobs, and added almost £980 million of GVA to the UK economy. Sea anglers support around 19,000 jobs in the supply sector, and the estimated benefit to suppliers is around £71 million; boat anglers are considered to have the largest impact.[xlix] Recreational angling is considered to have a relatively small impact on the environment and on target fish stocks, compared to commercial fisheries.[l]

Sea angling takes place all around the UK but the South West and South coasts of England have the largest concentrations of angling charter vessels (see Figure 10). The largest charter boat ports in the UK, are Weymouth and Poole. According to research conducted, 184,400 households in the South West participate in sea angling, with an estimated 240,900 individual sea anglers who live in the South West. Visiting anglers contribute significantly to the region's economy; with an estimated 750,000 days spent sea angling. This is worth £165 million annually in terms of expenditure within the region (£110 million from resident anglers and £55 million from visiting anglers). An estimated 3000 jobs are linked to sea angling in the region, through charter boats, mackerel-fishing trips and tackle shops.[li]

Figure 10: Distribution of sea anglers around the South West of England



Source: *Invest in Fish South West* (2005)

For the purposes of this report however, we are concerned only with the licensed fishing charter vessels based out of Poole.

Poole's charter boat fleet

Poole has the second largest charter boat fleet in the UK, with 33 registered charter boats operating from Poole, and a further 9 from Swanage that moor in Poole (the majority of which are listed in Table 6). A total of 42 charter boat skippers are employed in the Poole area (33 from Poole and 9 from Swanage); all are represented by the PDFA (Poole and District Fishermen's Association).

Poole is one the most popular angling destinations in the country, due to the ease of access and diversity of species.[lii] The most popular species for anglers to target is bass, followed by cod, mackerel, rays and sharks, conger eels and pollack. The recreational fishery in Poole also has a strong reliance on bass. In recent years, bass fishing has been subject to considerable reductions in fishing mortality, in response to a decline in stocks at EU level, where Emergency Measures were introduced in 2015. The area is very important as a destination for bass angling and there is a need to support the marketing and diversification (where appropriate) of this fishery. In 2016 the fishery was subject to a 'catch and release only' policy for the first part of the year,[liii] and during 2018 the fishery has been subject to a year-round 'catch and release only' policy.

Previous research estimated the gross turnover of the charter fleet to be £45,000 per vessel,[liv] which would mean that the estimated turnover for the Poole fleet was around £2 million per year, with 55 people being directly employed in the charter boat fishery, and a further 9 people directly employed in angling shops.

Table 6: List of Poole charter boat vessels and skippers from the CBUK website[lv]

	Vessel	Skipper	Port
1	Piscary	Matt Rowe	Poole, Dorset
2	Just Mary	Malcolm Collins	Poole, Dorset
3	Mistress Linda	Philip Higgins	Poole, Dorset
4	Silver Spray II	Sam Cumming	Poole, Dorset
5	Aries 3	Paul Harris	Poole, Dorset
6	Ocean Runner	Ryan Jones	Poole, Dorset
7	Blue Moon	Cliff Grant	Poole, Dorset
8	Trueblue	Steve Porter	Poole, Dorset
9	Boney M	Louis Medley	Poole, Dorset
10	Rapid Fisher	Paul Smith	Poole, Dorset
11	Blue Duo	John Stephenson	Poole, Dorset
12	Buccaneer	Steve White	Poole, Dorset
13	Rocket	Trevor Small	Poole, Dorset
14	Strongbow	Dick Peckham	Poole, Dorset
15	Random Harvest II	Andy Adams	Poole, Dorset
16	Sheilas Promise	Colin Walters	Poole, Dorset
17	San Gina	Tom Greasty	Swanage, Dorset
18	San Gina II	Tom Greasty	Swanage, Dorset

Image C. One of Poole's charter boats

Charter boats (Image C) and tackle shops do not provide the only turnover related to recreational angling. Owners of hotels, B&Bs, food and drink, fuel and transport businesses, as well as those involved in boat manufacture and maintenance, will also benefit from sea-angling tourism; even parking fees collected by the borough council can be significant. Charter skippers' expenditure includes moorings, insurance, maintenance, licences, and so on.

Competition between the sectors – whether spatially or by species – is a possible conflict or trade-off when it comes to sustainable and equitable management. As both the commercial and recreational sectors undertake fishing in the sea, it is inevitable that some interaction will occur. Spatial competition between charter boats and commercial fishing vessels at particular hot spots can be problematic and cause local tension. Conflict between commercial and recreational fishers has been a cause for concern in various locations, and Poole is no different. Some fish species are important to both sectors, and with stocks vulnerable to over-fishing there will be a cumulative impact. Sea bass (*Dicentrarchus labrax*) is a key species for each sector; prized by anglers but also noted as a non-quota species, sea bass is of critical importance to the southern English inshore fleet,[lvi] and other species such as mackerel and cod are also of interest to both. In the case of Poole, grey mullet is (unusually) an important species for the commercial fleet, while usually of recreational interest only in the rest of the UK. The same is true of wrasse. Competition (direct or indirect) is an ongoing issue for managers, whether over access to these stocks, or specific fishing areas.[lvii] Poole Harbour itself has been designated as a bass nursery area since the 1990s. This means that neither recreational nor commercial fisheries can take bass from Poole Harbour during the summer months (which is the time when the fish shoal and feed before migrating to offshore spawning grounds), other than in the harbour mouth or from shore.

Part four: The economic contribution of the small-scale coastal fleet and charter boat fleet to Poole

Valuation

In order to provide a useful indicator for the wider value created by the commercial and charter boat fishing fleets, we need to look beyond income or first sale value of the landed catch. The economic impacts of these activities do not cease once the fish is landed, or when a charter boat customer has returned from sea. Therefore, we conducted interviews with local stakeholders and industry experts, to establish some assumptions, values and proxies for use in this research and to develop the local economic impact calculations. Where appropriate we have used ranges; where uncertainty exists we have used the best available evidence; and where sentinel fleet or vessels were used that opted to share financial information, we undertook sensitivity analysis – as it is clear that not every operator has the same business model, income or expenses.

Methodology

To calculate the local economic impact of commercial fishing, an average price for each species caught, and the average landing size were required. This information was taken from MMO annual sea fisheries statistics[lviii] or using Southern IFCA data where that was known to be more accurate, e.g. in the case of manila clam landings. We used data from 2016 and 2017 to focus on the top 11 species landed in Poole Harbour, by taking an average landing value across the two years. Relative percentages of the top 11 species landed in Poole (in terms of where they were sold locally or whether they were exported) were taken from interviews with local stakeholders, producers and industry experts. This information was then used in combination with output multiplier values, created by Seafish (a Non-Departmental Public Body (NDPB) set up by the Fisheries Act 1981 to improve efficiency and raise standards across the seafood industry),[lix] to estimate the indirect and induced GVA (Gross Value Added) associated with each species. For this study, we use this indirect and induced GVA value to represent approximations of indirect output. An output multiplier calculates the amount of economic change that occurs as a result of changes in an industrial sector.[lx]

Further information was captured during June and July 2018, via interviews conducted with fishers and recreational charter boat skippers, local seafood buyers, merchants and wholesalers. They were asked a variety of questions, around which to base their assumptions, when calculating their respective local economic impacts. Questions for

charter skippers related to the number of trips per year, the average number of bookings and the charges per customer. For all sectors, questions concerning vessel costs, fuel use, maintenance and repairs, as well as licences, were also asked. The information gathered informed the modelling of local economic impacts.

Table 7 presents the local economic impact calculations for the top 11 species landed in Poole Harbour. The landing value represents gross output. Indirect output was calculated through multiplying gross output by the '% sold domestically' and then applying the relevant Seafish output multiplier (demersal 3.91, shellfish, 3.56). Total economic activity is calculated as the sum of gross output and indirect output.

Table 7: Local economic impact calculations for the top 11 species in Poole Harbour

Species	Landing Value (£)	% sold domestically	Output multiplier (Seafish)	Gross Output (£)	Indirect Output (£)	Total economic activity (£)
Manila Clam	£838,911	20.0%	3.56	£838,911	£597,305	£1,436,216
Whelks	£249,562	5.0%	3.56	£249,562	£44,422	£293,984
Lobsters	£249,286	72.5%	3.56	£249,286	£643,408	£892,694
Crabs	£220,159	35.0%	3.56	£220,159	£274,318	£494,476
Sole	£130,569	40.0%	3.91	£130,569	£204,209	£334,778
Cuttlefish	£71,939	5.0%	3.91	£71,939	£14,064	£86,003
Cockles	£69,133	20.0%	3.56	£69,133	£49,222	£118,355
Mullet	£58,140	42.5%	3.91	£58,140	£96,614	£154,754
Scallops	£58,085	50.0%	3.56	£58,085	£103,391	£161,476
Bass	£35,084	72.5%	3.91	£35,084	£99,456	£134,540
Plaice	£19,404	67.5%	3.91	£19,404	£51,212	£70,615
				£2,000,271	£2,177,620	**£4,177,891**

The open-book accounts for two charter boats were used as the basis on which to estimate the gross and indirect output for each charter boat (an average was taken). The owners requested that the information was presented anonymously. Table 8 presents a summary of this data.

Table 8: Local economic impact calculations for charter boats in Poole Harbour

Average Income 2016/17 (Gross Output)	Average Breakdown Costs (Indirect Output)	Number of Charter Boats	Gross Output	Indirect Output	Total Economic Activity	Total Economic Activity (75% performance)
£94,839	£78,791	33	£3,129,687	£2,600,103	£5,729,790	£4,297,343

The average income was estimated at £94,839, which represents gross output per charter boat. The number of charter boats currently operating a service in Poole Harbour is

33.[lxi]Gross output is calculated by multiplying this number by average income. Breakdown costs were estimated at £78,791, which represents indirect output. The types of cost found in this 'breakdown' category include fuel, advertising, equipment, repairs and maintenance. Similar to gross output, indirect output is calculated by multiplying the breakdown costs by the number of charter boats currently operating. Total economic activity is calculated by adding gross and indirect output together.

Table 9 brings together the economic activity values calculated for aquaculture, commercial fishing and chartered fishing, to produce a value for Poole Harbour of £12,522,931.

Table 9: Total economic activity for Poole Harbour fisheries

	Gross Output	Indirect Output	Total Economic Activity
Aquaculture in Poole Harbour	£1,590,000	£1,025,250	£2,615,250
Commercial fisheries (top 11 species)	£2,000,271	£2,177,620	£4,177,891
Charter boat fleet (estimated for 33 vessels)	£3,129,687	£2,600,103	£5,729,790
Total economic activity for all three sectors combined	**£6,719,958**	**£5,802,973**	**£12,522,931**

Part five: Conclusions - the future of the fishery

Both threats and opportunities exist for the small-scale fleet, the charter boat fleet and aquaculture, within Poole Harbour.

Threats

In the absence of an integrated strategy, and with the continued decline in catches, combined with the need for increasing effort, more commercial fishers will be lost from the fishery, and fisheries participants will become increasingly marginalized (thus exacerbating inequality locally). Possible displacement of fishers from certain protected areas together with issues surrounding the availability of quotas, may further compound the issue. The uncertainty regarding the impact of Brexit and the implementation of the Fisheries Bill mean that this is a crucial time for the industry both nationally and locally.

The barriers to entry for small-scale fisheries wanting to attain the types of accreditation required by large buyers of seafood mean that, despite the high quality, the potential value of that quality seafood will be dissipated and lost the local economy through lengthy supply chains. Local fishers become 'price takers' rather than 'price makers' and that value is lost in the local economy. This adds to other barriers to entry such as quota. Reduced available catching opportunities (quota restrictions) leads the fishing fleet in Poole and Purbeck to over-fish 'non-quota' species; this is a documented issue.[lxii]

In the absence of formalised stock assessments for the major fisheries (lobster, crabs, clams, whelks and bass), the sites are vulnerable to over-fishing. This is due to a lack of harvest control rules and management plans, which should be in place ensure that stocks are not over-exploited through unsustainable harvests. The high value of certain of the main target fisheries (in particular clams and cockles) that coexist within a marine protected area means that, despite cooperation in the regularised fisheries, there remain a significant threat of illegal fishing.

The problems of Illegal, Unregulated and Unsustainable (IUU) fishing continue to threaten legitimate fishing activity, with their risks of causing damage to the marine environment and to public perceptions of the local fishery. In recent times, and as described in their annual report for 2014/15, Southern IFCA[lxiii] showed that there were a greater number of prosecutions for illegal fishing activity in Poole than in any other part of the country. Enhanced enforcement by SIFCA has led to a significant reduction in illegal fishing and their innovative management has transformed the fishery. In 2018 the Poole Harbour clam and cockle fishery was granted certification status by the Marine Stewardship Council and consequently has become a very good example of how a 'blue tick' from the MSC can change public perception and contribute the blue economy. Using the MSC's method as a

vehicle to improvement, the Poole District Fishermen's Association (PDFA), supported by the Southern IFCA, was able to take ownership of the MSC certification scheme. This helped to develop the social capital that has carried the project from the beginning and for which SIFCA was issued with the 'best innovator' award.

The threat to the future of recreational angling stems from it being insufficiently differentiated or valued in planning policy, despite it making a significant contribution to the local economy. A reduced state-regulatory function resulting from austerity measures affects environmental issues, such as fisheries management. Clear threats also exist through the deregulation agenda and this cannot be countered by an industry-organised function, due to the fragmented nature of the market and the lack of shared goals and aspirations between industry participants and government.

Opportunities

In recent years there have been marked improvements in our knowledge of Poole's fishery stocks and local value chains. These developments, combined with recent dramatic improvements in the regulation and management of the Poole fisheries, provide a rationale and a base for three complementary types of investment intervention for the long-term economic benefit of the local economy. These are as follows:

Simple production

The first economic opportunity relates to moderate, gross production growth, within the strict limits of the sustainability for specific species such as Manila clams, by controlled incremental expansion of wild fishery landings.

Re-laying business model

There is the potential to support an expanded seasonal re-laying business model through the licensing of additional seabed areas, under the Poole Harbour Fishery Order 2015. As the clam and cockle fishery is seasonal, this second economic initiative would involve the re-laying of a proportion of stock. It would be dredged within the season onto licensed beds, for fattening and sale at the higher prices available in the closed season. The benefit of such a system would be to enable the markets to be maintained throughout the year, while increasing the spawning stock biomass in the harbour. This opportunity is not without challenges however, as the current fishers operate largely independently of one another, and competition is fierce at times. It is unrealistic to imagine plots for each of the fishers; organisational innovation could overcome this challenge.

Supply chain measures

The third economic strand relates to supply-chain investments, designed to achieve permanent increases in the value-added retained, within the local economy. Examples include: seed funding for a bi-weekly artisan fish market on Poole Quay; providing support

for small enterprises that currently focus on fishing only; adding value to products through supporting whole fisheries and small enterprises in gaining recognised accreditations.

The feasibility of the developments in Poole will be established through practicalities such as the viable size of the fleet, the direct involvement of the local fisheries industry in the plans, and various individual initiatives already shown by fishing families to improve their livelihoods and add value to their catch. However, improved organisation and support are needed, to assist these small enterprises in achieving their ambitions.

Charter fleet

An integrated strategy developed by stakeholders in conjunction with the local borough council, SIFCA and tourism businesses, could help to formulate an annual plan to develop the charter boat offering, for Poole. This should be developed in conjunction with best-practice guidelines to ensure that impact on favoured stocks is minimised, and that the conduct of anglers does not impact needlessly on non-target or undersize species.

Endnotes

[i] Balata, F. and Vardakoulias, O. (2016). *Turning back to the sea: A blue new deal to revitalise coastal communities*, New Economics Foundation, London. https://neweconomics.org/2016/11/turning-back-to-the-sea/

[ii] Balata, F. and Vardakoulias, O. (2016). *Turning back to the sea: A blue new deal to revitalise coastal communities*, New Economics Foundation, London. https://neweconomics.org/2016/11/turning-back-to-the-sea/

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variety of scientific names, a selection of which include: *Amygdala japonica, Amygdala philippinarum, Paphia philippinarum, Ruditapes semidecussatus, Tapes japonica, Venerupis japonica* and *Venus japonica*. From, Humphreys, J., R. W. G. Caldow, S. McGrorty, A. D. West & A. C. Jensen, (2007). 'Population dynamics of naturalised Manila clams *Ruditapes philippinarum* in British coastal waters' *Marine Biology* 151: 2255–2270) and Philippe, Goulletquer (1997), *A Bibliography of the Manila Clam, Tapes philippinarum*. France: Institute française pour recherche de l'exlpoitation de la mer, https://www.researchgate.net/publication/29492240_A_Bibliography_of_the_Manila_Clam_Tapes_philippinarum

'The currently recognised taxonomic name is *Ruditapes philippinarum* and is also known under a variety of names distinct to areas in which is found, these include: The Japanese littleneck clam, Japanese carpet shell, the asari clam, the baby necked clam, the short-necked clam, palourde japonaise and almeja japonesa.' Southern IFCA - Solent Manila Clam Management Plan (DRAFT, March 2018) provides both a general framework and specific guidance for implementing a strategic, coordinated, multi-partner management effort to manage clams in the Solent. This report is available from www.southern-ifca.gov.uk

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[xxxix] Note: in this instance local and exported landing price are the same, so there is no need to separate the two in the equation. This equation is required if they are different.

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[xliv] Sustainable fish cities. Website: http://www.sustainweb.org/sustainablefishcity/bournemouthandpoole/

[xlv] Not all sustainable fisheries are certified. This often occurs where smaller, or less profitable, fishing businesses can't afford the cost of certification by a third party, or because their fishery lacks the data needed for certification. The Marine Stewardship Council (MSC) provides the globally recognised certification system, which recently (May 2018) certified the clam and cockle fishery in Poole Harbour. https://fisheries.msc.org/en/fisheries/the-poole-harbour-clam-cockle-fishery/

[xlvi] The status of the stock of lobster in the South West area is moderate. Spawning biomass levels are between the minimum reference point limit and the level associated with Maximum Sustainable Yield (MSY), but is decreasing, particularly for females. The status of the stock of edible crab in the Western English Channel is good, with spawning stocks around the level required to produce MSY. The exploitation levels are close to the levels required to produce MSY (males below, females above). For whelks, no formal stock assessments are undertaken and the status of English fisheries and the status as regards to MSY is unknown. There are concerns among fishermen, scientists and fisheries managers regarding the sustainability of the fisheries. The only regulation in most areas is the EU Minimum Landing Size (MLS) of 45mm shell height; current management measures may not be adequate to conserve local whelk stocks, especially if the fishing effort were to increase as a result of displacement from other more regulated fisheries.

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[l] Tinch, R. et al (2015). *Comparing Industry Sector Values, with a Case Study of Commercial Fishing and Recreational Sea Angling*. Eftec for the UK Fisheries Economists Network, supported by Seafish, Defra, Marine Scotland.

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[lii] Higgins, P. (2016). 2 Annexe 9 - P. Higgins, Director Professional Boatman's Association (pers. comm.) email to Gary Wordsworth, Chairman of the Poole and District Fisherman's Association 23 Feb 2016 17:34

[liii] Marine Management Organisation (2018). *Bass fishing guidance 2017*. Crown copyright. https://www.gov.uk/government/publications/bass-fishing-guidance/bass-fishing-guidance

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[lv] Charter boats in Poole. CBUK website: http://www.charterboats-uk.co.uk/port/poole/

[lvi] In the UK, MRAG (2014) made a "direct comparison of the economic impact of recreational and commercial bass fishing off the Sussex coast. With various assumptions and uncertainties, they [MRAG] estimate the total landings from each sector – about 250 tonnes from commercial and 17-31 tonnes from recreational, with an estimate of 12-22 tonnes killed (kept, or dying after release) in 2012. Based on expenditures and multipliers, they further estimate that recreational fishing for bass supports £31m GVA and 353 FTE, compared to £9m and 111 FTE for the commercial fishery. The report demonstrates higher economic benefits from recreational fishing, but it also stressed that commercial fishing creates benefits beyond the provision and sale of fish, including positive contributions to coastal communities, the important role that they can have as an 'indigenous industry', the cultural traditions of inshore fishing and contributions to the social fabric of coastal communities. The MRAG study also identified that bass were important to particular segments of the commercial fishing industry because of a combination of high market value, seasonality, small quota allocation for other species (e.g. cod and plaice) and the non-quota nature of bass. For these fishers bass can play a role in overall fishing operations that would be difficult to replace, making restriction harder to bear than for other segments. Quoted in: Tinch, R. et al (2015). *Comparing Industry Sector Values, with a Case Study of Commercial Fishing*

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[lxi] Interview with the Poole professional boatman's association and PDFA.

[lxii] Davies, P., Williams, C., Carpenter, G. and Stewart, B. (2018) 'Does size matter? Assessing the use of vessel length to manage fisheries in England' *Marine Policy*. Elsevier, London.

[lxiii] Southern IFCA Annual Reports: http://www.southern-ifca.gov.uk/annual-reports