

**Title:** Assessing the significance of the economic impact of Marine Conservation Zones in the Irish Sea upon the fisheries sector and regional economy in Northern Ireland.

**Author names and affiliations.**

Francesca Moore [mooref@bv.com](mailto:mooref@bv.com)<sup>1,2</sup>

Dr. Jessica Lamond [Jessica.Lamond@uwe.ac.uk](mailto:Jessica.Lamond@uwe.ac.uk)<sup>1</sup>

Dr. Thomas Appleby [Thomas.Appleby@uwe.ac.uk](mailto:Thomas.Appleby@uwe.ac.uk)<sup>1</sup>

<sup>1</sup>University of the West of England, Bristol, Frenchay Campus, Coldharbour Ln, Bristol, UK, BS16 1QY

<sup>2</sup>Black & Veatch, 38 City Road, Chester, CH1 3AE

**Corresponding author.**

Francesca Moore [f\\_bourn@hotmail.com](mailto:f_bourn@hotmail.com)

**Present/permanent address.**

Black & Veatch, 38 City Road, Chester, UK, CH1 3AE

**Abstract**

This paper highlights the tension between advocacy for ‘Blue growth’ in maritime policy and efforts to safeguard future economic growth via the Marine Strategy Framework Directive. In 2015, policy-makers withdrew three of four proposed Marine Conservation Zones (MCZs) in the Irish Sea from consideration for designation, due to concerns that they could significantly impact on the fisheries sector in Northern Ireland because they overlap with prawn fishing grounds in the Irish Sea. Although research has quantified the potential impact upon fishing vessels, none has quantified the impact upon the fisheries sector nor assessed the significance of this impact. Arguably, MCZ designations (or lack thereof) based on the ‘significance’ of an impact require robust underpinning evidence. This paper reports the findings of an Economic Impact Assessment, which has quantified the impact of a decline in landings upon the Northern Ireland fisheries sector and regional economy (data which is currently lacking in the evidence base for the MCZ designation process in England). It finds that this will incur job losses in three fishing ports in Northern Ireland, but is unlikely to have a significant impact upon Northern Ireland’s fisheries sector and regional economy in terms of jobs and Gross Value Added (GVA). In the worst case, the resulting economic impact is a decrease of £1.05-1.12m/year GVA in Northern Ireland, which is 1.1% of the contribution of fishing and fish processing to the regional economy. Economic significance assessments,

using this methodology, may be useful in supporting the evidence base underpinning MCZ designation and other aspects of marine planning.

### **Highlights**

If the four MCZs are designated the key findings are that:

- 2.5% of the value of landings made by Northern Ireland vessels could be lost.
- 7% of all Northern Ireland fishermen could lose their income from fishing (assuming no substitution of fishermen income).
- 4% of the total number of jobs available in the fishing ports would be affected.
- The Northern Ireland economy would lose £1.05-1.12m/year (GVA) (assuming minimal substitution of prawn supply), which is 1.1% of the contribution of fishing and fish processing to the Northern Ireland economy (of £97.8m GDP (Seafish, 2006)). The actual economic impact will be less than this, accounting for any substitution of income and business adaptation in the fisheries sector.

### **Keywords**

Marine protected area, marine conservation zone, economic impact assessment, significance, fisheries.

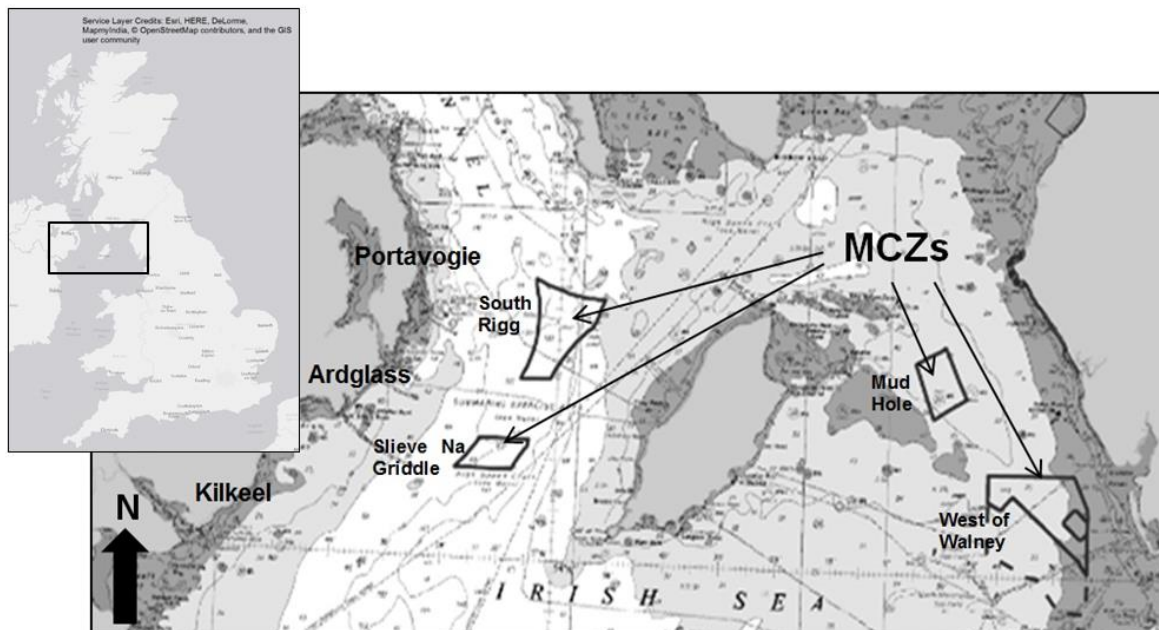
## 1 Introduction

1.1 Over recent years, there has been an unprecedented growth in marine regulation. It previously comprised mainly elements of general law and some sectoral regulation. Now, both EU and Member States have developed their own comprehensive regulatory frameworks for marine regulation. The UK and its devolved administrations have passed Marine Acts and the EU has enacted the Marine Strategy Framework Directive and the Maritime Spatial Planning Directive. The development of Marine Protected Areas (MPAs) has been central to this legislation to ensure the future protection of biodiversity and to set the framework for sustainable blue growth.

1.2 England and Wales have enacted legislation for Marine Conservation Zones (MCZs); a form of MPA aiming to safeguard vulnerable marine habitats and species and the benefits that they provide to society (Glenn et al., 2010). Such spatial management measures are playing an increasingly important role within the context of habitat and biodiversity loss, pollution and depleting fish stocks (Mee et al., 2015). The potential benefits are numerous and include climatic regulation, nutrient recycling, carbon sequestration, recreational opportunities, fisheries recruitment and aesthetic values (Fletcher et al., 2012). However, they can also be regarded as a direct threat to livelihoods and have the potential to significantly impact on some fishing activities (such as fisheries which deploy bottom-towed fishing gear) while other fisheries (such as those which deploy static, less invasive, fishing gears) may prosper from being permitted an increased range (Rees et al., 2010). The decision-making, regarding the designation of MCZs, is therefore subject to conflicting objectives and requires the use of suitable tools to assess the environmental and economic consequences.

1.3 In the UK context, the designation of MCZs is an ongoing debate. Twenty seven MCZs were designated in English waters in 2013 and a further twenty three in 2016; under the requirements of the Marine and Coastal Access Act (2009) (HM Government, 2009). MCZ designation in the Irish Sea is of particular controversy as four MCZs overlap with important prawn (*Nephrops norvegicus*) fishing grounds (Finding Sanctuary et al., 2012). One of these MCZs (West of Walney) was designated in early 2016. Whilst, the other three (Slieve Na Griddle, South Rigg and Mud Hole – see Figure 1) were withdrawn from consideration for designation in January 2015, due to concerns that they: “*could have a significant impact on the fishing sector, particularly in Northern Ireland*” (Defra, 2015, p.5)

assuming that bottom-towed fishing gear would be prohibited within them. These MCZs were re-classified as “sites for further consideration” (Defra, 2015, p.1) in later years.



**Figure 1 - Location of proposed MCZs and principal Northern Ireland fishing ports**  
© Crown Copyright and/or database rights. Reproduced by permission of the Controller of Her Majesty's Stationery Office and the UK Hydrographic Office ([www.ukho.gov.uk](http://www.ukho.gov.uk)).

1.4 Although research has quantified the potential impact upon the fisheries sector, the significance of this potential economic impact has received less attention. In order to address this gap, this paper has sought firstly to quantify the economic impact of designating four MCZs in the Irish Sea upon Northern Ireland's economy, paying particular attention to the fish processing sector and the fishing ports of Kilkeel, Portavogie and Ardglass; and secondly, to assess the significance of this economic impact upon the Northern Ireland fisheries sector and the regional economy.

## 2 Background

2.1 The economic impact assessment<sup>1</sup> (Econ IA) is increasingly part of the statutory architecture of decision-making. The UK Marine and Coastal Access Act 2009 (HM Government, 2009) explicitly states at section 117(7):

---

<sup>1</sup> (often referred to as an economic impact appraisal)

*“In considering whether it is desirable to designate an area as an MCZ, the appropriate authority may have regard to any economic or social consequences of doing so.”*

2.2 An Econ IA attempts to meet these statutory objectives by describing, quantifying and monetising the impact of an intervention within an industry. An Econ IA does not necessarily quantify net economic impact as one industry’s cost may be another industry’s revenue (Holland et al., 2010). It is usually sector-specific and is not generally used to compare changes in different sectors or the efficiency of policy decisions (Holland et al., 2010). Care needs to be taken when commissioning and interpreting an Econ IA as it is part of the decision-making landscape, and not a substitute for human judgment. However, Econ IA has been used to quantify the wider repercussive effects of MPAs on regional economies (e.g. for the Gulf of Maine in Dalton 2004; the Stellwagen Bank National Marine Sanctuary in Perez and Ruth, 2002) and also in terms of restrictions on marine resources (e.g. upon fisheries in Leeworthy & Whiley 2000; Jin et al., 2003; Teh, Teh & Sumaila 2011; Surís-Regueiro et al., 2014). It appears that this has arisen primarily to capture the concerns of industry (indirect costs, as well as direct costs) regarding MPAs and for policy makers to consider this evidence in their decisions.

2.3 Guidance on assessing the significance of economic impact is lacking. The Government’s own guidance says that: *“analysis should give a sense of the significance of the proposal. Orders of magnitude rather than detailed quantitative analysis should be sufficient”* (BIS, 2015, p. 74). Detailed analysis is rarely required and judgement seems to be based on ‘expert’ opinion. There is no definition of significance in the Marine and Coastal Access Act 2009 in relation to economic impact beyond the opportunity to ‘have regard’ for the findings, and the Econ IA itself is not mandatory.

2.4 This paper is an extension to analysis which has already quantified the impact of MCZs in the Irish Sea upon the UK fisheries sector. The impact assessment prepared for UK Government regarding proposed MCZs in English waters (Finding Sanctuary et al., 2012), hereon after referred to as the MCZ IA, assumed that bottom-towed gears would be prohibited within the four MCZs of concern in this paper, based on advice from the statutory nature conservation bodies in the UK (Natural England the Joint Nature Conservation Committee).

2.5 The MCZ IA (Findings Sanctuary et al., 2012) found that, in the best estimate<sup>2</sup>, the prohibition of bottom-towed gears in these four MCZs would decrease landings by all UK vessels to the value of £1.7m/year (roughly £0.6m GVA/year)<sup>3</sup>. Work completed for the MCZ IA, found that for Northern Ireland vessels only, this would be in the region of £1.28m/year (roughly £0.45m GVA/year)<sup>4</sup> (ISCZ, 2011). This is based on the assumption (based on interviews and fishing boat effort analysis) that roughly 75% of landings by value from the MCZs in the Irish Sea are made by Northern Ireland vessels (ISCZ, 2011).

2.6 Another report, commissioned by Seafish on behalf of the Northern Ireland fishing industry (Poseidon, 2012), quantified the value of fisheries landings from the area of fishing grounds covered by the four MCZs. It used data provided by the Agro-Fisheries and Biological Institute in Northern Ireland, to adjust the value of landings estimates to reflect the higher price achieved for prawns caught in two of the four MCZs. This report found that:

*“the estimated annual value of Northern Ireland landings from the MCZ areas averages £1.2m. The loss of this revenue would have a major impact on the Northern Ireland fishing industry and the sectors and communities that depend upon it.”*  
(Poseidon, 2012 p.3).

2.7 Together these reports estimate, that if these four MCZs were to be designated, and the use of bottom-towed gears prohibited within them, that landings made by Northern Ireland vessels would decrease by £1.2-1.28m/year (or £0.42-0.45m GVA/year) (Poseidon, 2012; Findings Sanctuary et al., 2012; ISCZ, 2011). This represents just under 10% of the value of prawns landed by UK vessels into Northern Ireland (of £13.5m, average over 5 years, 2008-2012; MMO, 2013). Figures may be misleading unless carefully defined; for example, not all of the catch affected (of the £1.2-1.28m/year) would typically be landed into Northern Ireland (the majority is likely to be however). As such, these figures are likely to over-estimate the impact on the Northern Ireland regional economy. Therefore, arguably, neither report accurately estimates the net economic consequence of designating these four MCZs in the Irish Sea upon the Northern Ireland fisheries sector. The purpose of this paper

---

<sup>2</sup> The best estimate was defined by Defra (Finding Sanctuary et al., 2012) and assumes that 50% of the value of landings from fishing grounds in the MCZ will be lost (to allow for some uncertainty around the value data and for recovery of some landings from other fishing grounds).

<sup>3</sup> Based on GVA factor of 0.35 for fishing vessels (average of operating profit + crew share of total turnover for Area VIIA nephrops single-rig trawl, Area VIIA nephrops twin-rig trawl and Irish Sea demersal trawl over 10metres from Seafish 2012).

<sup>4</sup> *Ibid.*

is therefore to see what additional evidence could be gathered to improve the accuracy of the forecasted economic impact for decision-makers.

2.8 Neither do these reports (Poseidon, 2012; Finding Sanctuary et al., 2012) assess the significance of the economic impact on the Northern Ireland fisheries sector nor its regional economy, nor did they consider the behavioural response of those most affected. The response or adaptive behaviour of those impacted by MCZs is captured by the term 'economic resilience'. This is the ability of businesses and communities "to bounce-back or comeback from economic shocks and disruptions" (OECD 2009 in Dawley et al., 2010 p.652). In the last decade, the concept of resilience has emerged in response to new economic threats such as globalisation and climate change (Mackinnon & Derickson, 2013). Local economies are increasingly interested in how to build economic resilience to such threats (Miller et al., 2010; CLES 2010). It follows that economic resilience, or a business' ability to adapt and respond to an economic impact, is crucial to consider when measuring additionality, as this inherently will determine the residual economic impact – yet this appears to be neglected in the Econ IA literature.

### **3 Materials and Methods**

3.1 The methodology applied here is based on Government guidance for producing economic impact assessments in the UK (BIS, 2015; HM Treasury, 2013; Homes & Communities Agency, 2014; Scottish Enterprise, 2008), and describes and quantifies the most likely marginal impacts relative to the baseline (BIS, 2015). This Econ IA quantifies the impact of a decline in landings upon the Northern Ireland fisheries sector and regional economy (data which is currently lacking in the evidence base for the MCZ designation process in England). It estimates the combined impact upon all businesses affected (i.e. auctioneers, merchants, fish producers organisation, fish handlers and fish processors) including retail businesses who supply fishermen (i.e. vessel fitters, manufacturers, chandleries, cafes).

3.2 The research was undertaken in four key tasks. Firstly, a literature review gathered readily available baseline information and existing impact assessment findings, in order to ascertain the gap in impact evidence underpinning the MCZs in question. Secondly, semi-structured interviews were completed with three of the four existing prawn processors in Northern Ireland in 2015. Another interview was completed with the Anglo-Northern Irish Fish Producers' Organisation (ANIFPO) who began processing prawns in January 2016.

Thirdly, Econ IA analysis was undertaken. It was not possible to conduct an input-output analysis specific to the Northern Ireland fisheries sector for this research. As such, published multipliers for the UK fisheries sector have been used. Lastly, literature and statistics were reviewed to assess the significance of the quantified impact upon the fishing ports of Kilkeel, Portavogie and Ardglass, the Northern Ireland fisheries sector and the regional economy. As recommended by BIS (2010), employment data was used to understand the significance of the impact.

3.3 Due to the low number of interviewees (there are only four prawn processors in Northern Ireland) and confidentiality concerns, the findings of these interviews are not reproduced in this paper. However, their combined evidence (as set out in Moore, 2015) has informed the assumptions made in the Econ IA, particularly with regard to business resilience and adaptation strategies.

#### **4 Calculations: impact upon the Northern Ireland economy**

4.1 A decrease in landings of prawns (*Nephrops norvegicus*) into Northern Ireland will affect the output of the prawn processing sector, and also the sectors that are dependent on the prawn trade in Northern Ireland. Multipliers sourced from the University of Strathclyde (2002) and updated by Seafish (2006) have been used to quantify this impact. The income multiplier approach has been used (Campbell and Brown, 2003) to quantify the impact upon GVA, which is the policy makers' measure of choice (BIS 2010). It is based on an established methodology published by the Scottish Enterprise (2008).

4.2 Every effort has been made to estimate the net economic impact, over and above what would have occurred in the absence of designating MCZs, as defined by the Government's 'Green Book' (HM Treasury, 2013). The calculations have estimated the following factors: deadweight (or the baseline), leakage, displacement, substitution and indirect impacts on the supply chain (such as fisheries agents, wholesalers and retailers). The resulting impact, net of all these other factors, is referred to as 'additionality' and is the accepted definition of the impact of an intervention (HM Treasury, 2013; Homes & Communities Agency, 2014).

4.3 An estimation of net economic impact would also account for any benefits accrued to the fisheries sector as a consequence of the designation of MCZs in the Irish Sea (e.g. increased landings due to possible spillover effects (Bennett & Hough, 2005). However, it



has not been possible to quantify this for the purpose of this research due to a lack of readily available useable data. As such, the findings published here model the worst case eventuality.

## 5 Results

5.1 If these four MCZs were to be designated, and bottom-towed gear prohibited within them, the economic impact is estimated to be a decrease of £1.05-1.12m/year (GVA) in Northern Ireland. This is based on the evidenced assumption that just under 10% of the value of prawns landed by UK vessels into Northern Ireland (of £13.5m, average over 5 years, 2008-2012; MMO, 2013) would be affected. This has converted the financial impact on fishing vessels (of a loss in value of landings in the region of £1.2-1.28m/year) to a regional economic impact by taking into account Green Book principles. Table 1 sets out the calculation and assumptions based on guidance by the Scottish Enterprise (2008).

**Table 1 – Calculation of impact of the designation of four MCZs upon the Northern Ireland economy**

Variable	Assumption	Value
a. Value of landings (mostly prawns) lost due to four MCZs assuming bottom-towed gears are prohibited	-	-£1.2-1.28m/year
b. Leakage	0%	As above
c. Displacement	-10% x a.	-£1.08-1.15m/year
d. Substitution	0%	As above
e. Multiplier (indirect & induced)	3.34 x c.	-£3.61-3.85m/year
f. Economic impact (GVA)	0.29 x e.	-£1.05-1.12m/year
g. Economic impact (fishermen jobs)	45 x a.	54 to 58
h. Economic impact (further jobs)	28 x a.	34 to 36

5.2 In terms of employment, the economic impact (GVA) is equivalent to a loss of roughly 88 to 94 jobs in the entire fisheries sector and supply chain (see Table 1, g + h). For comparison, when the GVA impact value is divided by the average GVA per head for the

West and South of Northern Ireland NUTS3 (which was £14,573 per head in 2013 (ONS, 2014)); the estimated loss in jobs is slightly less (72 to 77 jobs). These figures represent the change in economic activity in the fisheries sector and the resulting change in Northern Ireland's GVA. These figures do not represent the net economic impact upon the UK's GVA which is likely to be negligible. This is because the UK's fisheries sector is likely to substitute the lost income when it is this low, by other means (e.g. diversification of prawn supply, target species, business services or product) that will ultimately still benefit the UK economy.

### *Assessing leakage*

5.3 Leakage is defined as “the proportion of outputs that benefit those outside of the intervention's target area or group” (Homes & Communities Agency, 2014, p.22). In this instance it refers to prawns landed into Northern Ireland that are then sold directly outside of Northern Ireland. Based on statistics collected from prawn processors (Moore, 2015), it is assumed that there is no net leakage effect. This is because although a proportion of prawns landed into Northern Ireland are immediately transported to the Republic of Ireland and to Scotland; in 2014 there was a net import of prawns landed from other countries into Northern Ireland. This is most likely due to the demand created by Whitby Seafoods and Youngs who re-located to Kilkeel following the decline in North Sea prawn stocks in 2011 (Moore, 2015). A proportion of processed whole prawns are exported abroad, and most of the prawns processed in Northern Ireland into scampi products are sold elsewhere in the UK. However, this is after they have been processed and have benefitted the Northern Ireland economy.

### *Assessing displacement*

5.4 Displacement is defined as “the proportion of intervention outputs/outcomes accounted for by reduced outputs/outcomes elsewhere in the target area” (Homes & Communities Agency, 2014, p.28). In this instance, this is the replacement of lost landings by processors sourcing prawn from elsewhere e.g. increasing imports of prawn from the Republic of Ireland. A reasonable assumption of 10% is made for the purposes of this research (i.e. that 10% of the impact of a decline in landings would not occur, as an alternative source of prawns could be sourced from elsewhere, that would mitigate the impact upon Northern Ireland) (Moore, 2015). A permanent impact of a decrease in prawn landings from MCZs (again, assuming no benefits of MCZs to prawn catch here), would result in a permanent adjustment of the market. A decrease in supply would most probably result in an increase in prawn prices (as occurred following the North Sea prawn stock crash

in 2011). For this analysis, constant prices are assumed and prawn price increases have not been modelled.

### *Assessing substitution*

5.5 Substitution is defined as “when a firm substitutes one activity for a similar one (such as creating jobs whilst cutting other jobs ..... It can be thought of as “within firm” displacement” (Homes & Communities Agency, 2014, p.31). In this instance this refers to businesses diversifying their income away from prawn products to new products and services, in order to maintain profitability and jobs; or fishing vessels diversifying their income to target other species, fishing areas or away from fishing to offering recreational trips for example.

5.6 The effect of substitution is assumed to be zero for the purposes of this research. However, in reality processors are likely to be able to do this to some extent (as indicated by the interviews with Northern Ireland based prawn processors in 2015 (Moore, 2015). The extent to which they can do this depends in part on the current market dynamic, the duration of the impact on landings, and the extent to which they may already be adapting to other external market shocks at any given time (e.g. the slump in prawn landings in 2011 from the North Sea following the crash in prawn stocks) (Moore, 2015). The decrease in landings scenario used in this analysis is already based on an assumption in the MCZ IA that fishing vessels will be able to recoup half of the value of their landings by other means (Finding Sanctuary et al., 2012).

### *Limitations*

5.7 There are numerous limitations with this approach although every effort has been made to make this as robust an analysis as possible based on readily available data. The limitations are:

- The multipliers used are based on Scottish data not Northern Ireland data. If based on Northern Ireland data the multipliers would be most likely be smaller (as the fisheries sector in Northern Ireland is smaller than in Scotland) and so the economic impact estimated above is likely to be an over-estimate;
- The multipliers were designed for use in scenarios that estimate an increase in landings of shellfish not a decrease. An increase in landings is likely to encourage investment in existing and new boats with associated supply chain impacts. Whereas a decrease in landings would not result in such supply chain investment

and so the multiplier would be most likely be lower (and so the economic impact estimated above is likely to be an over-estimate);

- The multipliers take no account of change in prawn prices associated with a constraint in supply (assuming constant or increased demand). An increase in prawn price associated with a decrease in landings (as was the case in 2011) would increase profitability (net of additional steaming costs) for larger, more efficient vessels. Some smaller fishing vessels are unlikely to maintain profitability in these circumstances as they would have to travel further at greater cost. It is not clear what impact this would have on the estimated economic impact;
- This research sought to model the residual impact on the Northern Ireland economy, after taking into account the dependency of the fish processors upon prawns and their behavioural response a decrease in supply. However, this has not been possible within the resources of this research (as this would require bespoke input-output tables to be calculated). If this was taken into account, the economic impact would be lower because the fisheries sector will be able to source part of its income from elsewhere (based on Holland et al., 2010); for example, by increasing the volume of prawns sourced from outside of Northern Ireland (it already sources some from the Republic of Ireland), or by diversifying into other products and services (as in part they are already doing);
- It is outside the scope of this research to quantify the net present value of this economic impact over a period of time. If it were to do so, it would be necessary to consider the reference case or *“the position in terms of target outputs and outcomes that would occur at the end of the intervention life if the intervention was not implemented”* (Homes & Communities Agency, 2014, p.17). This would need to estimate the future trend in prawn landings into Northern Ireland. No such analysis has been completed nor is currently available (DARD, 2015a).

## **6 Discussion: assessment of significance**

6.1 This section assesses the significance of the impact of designating the four MCZs upon Northern Ireland. It is split into four sections: significance of the impact upon landings, fishermen, fish processors and the Northern Ireland economy. Published statistics are used to interpret, and to give meaning to, the findings of this research.

### ***Significance of the impact upon landings***

6.2 Existing research estimates that the designation of these four MCZs will result in a decrease in landings made by Northern Ireland vessels into the UK of £1.2-1.28m/year. This impact on landings represents 2.5% of total landings made by Northern Ireland vessels into the UK (of £56.1m in 2012) and 0.3% of all UK vessel landings (MMO, 2013).

6.3 Landings of prawns, year on year, are very dynamic and fluctuate depending on factors such as the weather, fuel prices, market demand, quota allocation and effort restrictions. It is reasonable to state that a decrease of 2.5% in total landings by Northern Ireland vessels into the UK, is insignificant compared to the baseline increase of 70% in total landings, by volume and value, by Northern Ireland vessels into the UK between 2008 and 2012 (MMO, 2013).

***Significance of impact upon fishermen and the fishing ports***

6.4 The decrease in landings is equivalent to roughly 54 to 58 fishermen in Northern Ireland losing all of their income from fishing (see Table 1) representing 5-7% of all Northern Ireland fishermen (DARD, 2015b). This is on top of the ongoing downward trend in the number of fishermen in the UK; a decrease of 40% over 20 years since 1992 (MMO, 2013). However, the net economic impact will be less as in reality, a proportion of these fishermen will be able to substitute part, or in some cases all, of their income (Holland et al., 2010).

6.5 Assuming that 56 fishermen could be affected, and assuming that the affected fishermen are evenly distributed across the three fishing ports; this represents 4% of the number of jobs in each of the fishing ports of Ardglass, Kilkeel or Portavogie (see Table 2). For Northern Ireland as a whole, up to 0.1% of jobs would be affected.

6.6 However, Portavogie is more dependent on fishing than Ardglass and Kilkeel: 53% of its jobs are in fishing, compared to 22% in Ardglass and 14% in Kilkeel (see Table 2). As such, arguably Portavogie would be more vulnerable to the impact; especially if it incurred more than its fair share of job losses.

**Table 2 – The impact of designating four MCZs in the Irish Sea upon fishermen and employee jobs in Northern Ireland’s principal fishing ports.**

Fishing port, region and country	Total number of fishermen in 2013 and (number of	Total employee jobs	% of fishermen of total number of employment jobs (%)

	<b>fishermen affected by MCZs)</b>		<b>jobs potentially affected by MCZs)</b>
Ardglass	111 (18)	496	22% (4%)
Kilkeel	395 (19)	2735	14% (1%)
Portavogie	250 (19)	474	53% (4%)
Newry, Mourne & Down	506 (56)	32,053	1% (<1%)
Northern Ireland	814 (56)	693,308	0.1% (<1%)

Source: DARD (2015b) and DETINI (2011)

6.7 A lower proportion of the number of residents in employment, living in each of the fishing ports, would be affected (see Table 3). Approximately 10% of residents in each of the three fishing ports have jobs as fishermen; at most 1% of these jobs in each port would be affected by the designation of MCZs. For Northern Ireland as a whole, up to 0.1% of residents in work would be affected.

**Table 3 – The impact of designating four MCZs in the Irish Sea upon fishermen and residents in employment in Northern Ireland’s principal fishing ports.**

<b>Fishing port, region and country</b>	<b>Total number of fishermen in 2013 and (number of fishermen affected by MCZs)</b>	<b>Total residents in employment</b>	<b>% of fishermen of total number of residents in employment (% residents in jobs potentially affected by MCZs)</b>
Ardglass	111 (18)	1284	9% (1%)
Kilkeel	395 (19)	2780	14% (<1%)
Portavogie	250 (19)	2057	12% (<1%)
Newry, Mourne & Down	506 (56)	73,458	1% (<1%)

Northern Ireland	814 (56)	795,263	0.1% (<1%)
------------------	----------	---------	------------

Source: DARD (2015b) and NISRA (2011)

6.8 Some of Northern Ireland's fishing vessels have diversified and make part of their living by other means; such as by targeting other shellfish (crab and lobster), as well as targeting pelagic and demersal species outside of the Irish Sea (Finding Sanctuary, 2012). ANIFPO (2015) stated that 70% of the value of landings made by its member vessels come from pelagic species (rather than prawns), albeit representing only three vessels. It also says that a third of its vessels (14 vessels) have re-equipped in order to be able to work for the offshore energy sector (ANIFPO, 2015). As such, it is reasonable to assume that the Northern Ireland fishing fleet would be able to adjust, at least in part, in response to a decrease in their total landings of 2.5% by value.

### ***Significance of impact upon the Northern Ireland economy***

6.9 The overall economic impact is estimated to be £1.12m/year (GVA) in Northern Ireland (the worse-case scenario). This represents:

- Less than 0.001% of Northern Ireland's GVA which was £18,196m in 2012 (NISRA, 2013).
- Less than 0.1% of GVA in the Local Government District (Newry, Mourne and Down) which was £1240m in 2012 (NISRA, 2013);
- 0.1% of the UK's entire shellfish processing sector GVA which was £456m in 2012 (Seafish, 2015).
- 1.1% of the contribution of fishing and fish processing to the Northern Ireland economy (of £97.8m GDP (Seafish, 2006)).

6.10 The net economic impact will be less as in reality the fisheries sector will be able to source part of its income from elsewhere (based on Holland et al., 2010); for example, by increasing the volume of prawns sourced from outside of Northern Ireland (it already sources some from the Republic of Ireland), or by diversifying into other products and services (as in part they are already doing) (Moore, 2015).

## **7 Conclusions**

7.1 Whilst it is likely that the designation of four MCZs in the Irish Sea will incur job losses in the three fishing ports of Ardglass, Portavogie and Kilkeel; this research has found that the economic significance of this impact is likely to be low. The four MCZs are unlikely to have a significant impact upon the Northern Ireland fisheries sector and the regional economy. This finding is in contrast to the conclusions of other reports (Poseidon, 2012; Defra, 2015). Albeit, neither of these reports quantitatively assess the significance of the regional economic impact as this paper has done.

7.2 If the four MCZs are designated, and bottom-towed gears prohibited within them, the key findings are that:

- 2.5% of the value of landings made by Northern Ireland vessels could be lost, representing 0.3% of all UK vessel landings. This compares to a baseline increase of 70% in total landings (by volume and value) by Northern Ireland vessels into the UK between 2008 and 2012 (MMO, 2013);
- This is equivalent to 7% of all Northern Ireland fishermen losing their income from fishing (assuming no substitution of income). This represents 1% of residents in jobs in the affected fishing ports, and 4% of total jobs available in the affected fishing ports;
- The resulting economic impact is estimated to be a decrease of £1.05-1.12m/year (GVA) in Northern Ireland. This is equivalent to 1.1% of the contribution of fishing and fish processing to the Northern Ireland economy (of £97.8m GDP (Seafish, 2006)). The actual economic impact will be less than this, allowing for some substitution of income in the fisheries sector.

7.3 Econ IA does not measure efficiency and so is not used to inform policy decisions. Yet, in this instance, four MCZs were withdrawn due to concerns that they could have a significant impact on the fisheries sector in Northern Ireland; an assertion which can most sensibly be informed by Econ IA. Arguably, therefore Econ IA evidence is often required to support policy decisions; or in this case, the designation of MCZs. The case highlights the requirement for good practice guidance which, this research suggests, may as a minimum include the following; as it is these analyses that reveal the significance of the resulting economic impact:

- Comparison of the Econ IA findings when assessed at different geographic scales (local, sub-regional, regional, national);
- Comparison of the Econ IA findings before and after, the baseline resilience (including cumulative impacts) and the ability of those impacted to adapt further;



- Comparison of the Econ IA findings before and after, appropriate mitigation measures have been identified and analysis of the residual economic impact;
- Identification of acceptable 'significance' thresholds (in advance of the Econ IA via appropriate public and stakeholder consultation).

7.4 This research has narrowly defined economic impact in terms of the market-based metric of 'GVA', rather than in terms of wider notions of economic welfare (which would include changes in consumer surplus and producer surplus, and capture the ecosystem services benefits of MCZs). As such, the two approaches cannot be compared.

7.5 Lastly, this research has been unable to objectively define what is significant and what is not significant in terms of regional economic impact; in part due to a lack of guidance and literature regarding this. This highlights firstly, the largely subjective, and often sectoral, nature of understanding significance; secondly, the risks this presents to marine legislation that seeks to maximise societal gains and to safeguard future economic development.

## 8. Acknowledgements

8.1 This research is co-funded by Lloyd's Register Foundation, a charitable foundation helping to protect life and property by supporting engineering-related education, public engagement and the application of research.

## References

ANIFPO (2015) A. McCulla interviewed by F.Moore 17 April.

Bennett, D. and Hough, A. (2007) *Loch Torridon Nephrops Creel Fishery: Certification Report*. [online]. Derby: Moody Marine Ltd. Available from: [https://www.msc.org/track-a-fishery/fisheries-in-the-program/exiting-the-program/withdrawn/loch\\_torridon\\_nephrops\\_creel/reassessment-downloads-1/Draft\\_Report\\_Dec07.pdf](https://www.msc.org/track-a-fishery/fisheries-in-the-program/exiting-the-program/withdrawn/loch_torridon_nephrops_creel/reassessment-downloads-1/Draft_Report_Dec07.pdf) [accessed 03 August 2015].

Campbell H.F. and Brown R. P.C. (2003) *Benefit-cost analysis: financial and economic appraisal using spreadsheets*. 1<sup>st</sup> ed. England. Cambridge University Press.

Centre for Local Economic Strategies (CLES) (2010) *Productive local economies: creating resilient places* [online]. Manchester: Centre for Local Economic Strategies. Available from: [www.cles.org.uk/wp-content/uploads/2011/01/Resilience-for-web1.pdf](http://www.cles.org.uk/wp-content/uploads/2011/01/Resilience-for-web1.pdf) [accessed 19 July 2013].

Dalton T.M. (2004) 'An approach for integrating economic impact analysis into the evaluation of potential marine protected area sites' *Journal of Environmental Management* 70 p.333–349.

Dawley S., Pike A. and Tomaney J. (2010) 'Towards the Resilient Region?' *Local Economy* 25 pp.650.

Department for Business Innovation and Skills (BIS) (2010) *Understanding local growth. BIS Economics Paper No. 7* [online]. London: Department for Business innovation and Skills. Available from: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/32113/10-1226-understanding-local-growth.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32113/10-1226-understanding-local-growth.pdf) [accessed 06 July 2015].

Department for Business Innovation & Skills (BIS) (2015) *Better Regulation Framework Manual: Practical Guidance for UK Government Officials* [online]. London: Department for Business innovation and Skills. Available from: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/211981/bis-13-1038-better-regulation-framework-manual-guidance-for-officials.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211981/bis-13-1038-better-regulation-framework-manual-guidance-for-officials.pdf) [accessed 30 January 2015].

Department for Environment, Food and Rural Affairs (Defra) (2015) *Mud Hole: Candidate Marine Conservation Zone not proposed for designation in the second tranche* [online]. London: Department for Environment, Food and Rural Affairs. Available from: [https://consult.defra.gov.uk/marine/tranche2mczs/supporting\\_documents/Mud%20Hole%20cMCZ%20site%20summary.pdf](https://consult.defra.gov.uk/marine/tranche2mczs/supporting_documents/Mud%20Hole%20cMCZ%20site%20summary.pdf) [accessed 01 February 2015].

Department of Agriculture and Rural Development (DARD) (2010) *Size and Performance of the Northern Ireland Food and Drinks Processing Sector, Ten Years Statistics, 2000 to 2009* [online]. Belfast: Policy and Economics Division, Department of Agriculture and Rural Development Northern Ireland. Available from:

<http://www.dardni.gov.uk/index/statistics/statistical-reports/size-and-performance-of-the-ni-food-and-drinks-processing-sector.htm> [accessed 02 March 2015].

Department of Agriculture and Rural Development (DARD) (2015a) P. Campbell email correspondence with F. Moore, 11 May.

Department of Agriculture and Rural Development (DARD) (2015b) P. Campbell email correspondence with F. Moore 01 May.

Department of Enterprise, Trade and Investment Northern Ireland (DETINI) (2011) *Census of Employment 2009* [online]. Belfast: Department of Enterprise, Trade and Investment Northern Ireland. Available from: <http://www.detini.gov.uk/deti-stats-index/stats-surveys/stats-census-of-employment.htm>. [accessed 24 September 2014].

Finding Sanctuary, Irish Seas Conservation Zones, Net Gain and Balanced Seas (2012) *Impact Assessment materials in support of the Regional Marine Conservation Zone Projects Recommendation* [online]. Available from: <http://jncc.defra.gov.uk/page-6231> [accessed 02 March 2015].

Fletcher S., Saunders J., Herbert R., Roberts C. and Dawson K. (2012) 'Description of the Ecosystem Services Provided by Broad-Scale Habitats and Features of Conservation Importance that are Likely to be Protected by Marine Protected Areas in the Marine Conservation Zone Project Area'. Peterborough: Natural England Commissioned Reports, Number 088.

Glenn H., Wattage P., Mardle S., Van Rensburg T., Grehan A. and Foley N. (2010) 'Marine protected areas - substantiating their worth' *Marine Policy* 34 (3) pp. 421–430.

HM Government (2009) Marine and Coastal Access Act. Crown Copyright.

HM Treasury (2013) *The Green Book: appraisal and evaluation in central government* [online]. London: HM Treasury. Available from: [www.hm-treasury.gov.uk/data\\_greenbook\\_index.htm](http://www.hm-treasury.gov.uk/data_greenbook_index.htm) [accessed 30 January 2015].

Holland D., Sanchirico J., Johnston R. and Jogelkar D. (2010) *Economic Analysis for Ecosystem - Applications to Marine and Coastal Environments*. 1<sup>st</sup> Edition. London: Routledge. ISBN. 1933115742.

Irish Sea Conservation Zones (ISCZ) (2011) *Verification of landings estimate*. F. Moore email correspondence to Anglo-Irish Fish Producers Organisation, 05 October 2011.

Leeworthy V.R and Whiley P.C. (2000) *Proposed Tortugas 2000 Ecological Reserve: socio-economic impact analysis of alternatives*. [online]. Washington D.C: NOAA National Ocean Service. Available from:  
<http://sanctuaries.noaa.gov/science/socioeconomic/floridakeys/pdfs/tortugasinitassess.pdf>  
[accessed 04 August 2015].

Mackinnon D. & Derickson K.D. (2013) 'From resilience to resourcefulness: a critique of resilience policy activism' *Progress in Human Geography* 37 (2) pp. 253-270.

Marine Management Organisation (MMO) (2013) *UK Sea Fisheries Statistics 2012. TABLE 3.1 Landings into the UK and abroad by UK vessels: 2008 to 2012* [online]. London. Marine Management Organisation. Available from:  
<https://www.gov.uk/government/statistical-data-sets/uk-sea-fisheries-annual-statistics-2012>  
[accessed 02 March 2015].

Mee, L., Cooper, P., Kannen, A., Gilbert, A. J., & O'Higgins, T. (2015) 'Sustaining Europe's seas and coupled social-ecological systems' *Ecology & Society* 20 (1)

Miller F., Osbahr H., Boyd E., Thomalla F., Bharwani S., Ziervogel G., Walker B., Birkmann J., Van der leeuw S., Rockstrom J., Hinkel J., Downin T., Folke C. and Nelson D. (2010) 'Resilience and vulnerability: complementary or conflicting concepts?' *Ecology & Society* 15 (3) pp.11.

Moore, F. (2015) *Marine Conservation Zones: Assessing the significance of their economic impact upon the fisheries sector in Northern Ireland*. Unpublished thesis. University of the West of England, Bristol.

Northern Ireland Statistics and Research Agency (NISRA) (2011) *Census 2011* [online]. Available from: [http://www.nisra.gov.uk/census/2011\\_results.html](http://www.nisra.gov.uk/census/2011_results.html) [accessed 02 March 2015].

Northern Ireland Statistics and Research Agency (NISRA) (2013) *Annual Business Inquiry 2012* [online]. Available from: <http://www.ninis2.nisra.gov.uk/public/Theme.aspx?themeNumber=129&themeName=Business and Energy> [accessed 24 September 2014].

Office for National Statistics (ONS) (2014) *Gross Value Added (GVA) from 1997 to 2013 for the regions and sub-regions of the UK* [online]. London: Office for National Statistics. Available from: [http://www.detini.gov.uk/gross\\_value\\_added](http://www.detini.gov.uk/gross_value_added) [accessed 06 July 2015].

Perez M. and Ruth M. (2002) *Effectiveness and economic benefits of Stellwagen Bank National Marine Sanctuary*. Report prepared for Environmental Defense. In Dalton T.M., (2004) 'An approach for integrating economic impact analysis into the evaluation of potential marine protected area sites' *Journal of Environmental Management* 70 pp.333–349.

Poseidon (2012) *The value of Irish Sea Marine Conservation Zones to the Northern Irish fishing industry* [online]. Maghera: Poseidon Aquatic Resource Management Ltd. Available from: [http://www.seafish.org/media/Publications/Poseidon\\_NI\\_MCZ\\_valuation\\_final\\_report\\_August\\_2012\\_2\\_.pdf](http://www.seafish.org/media/Publications/Poseidon_NI_MCZ_valuation_final_report_August_2012_2_.pdf) [accessed 02 March 2015].

Rees S.E., Attrill, M., Austen, M.C. Mangi, S.C. Richards, J.P. and Rodwell L.D. (2010) 'Is there a win-win scenario for marine nature conservation? A case study of Lyme Bay, England' *Ocean and Coastal Management* 53(3) pp 135-145.

Scottish Enterprise (2008) *Additionality & Economic Impact Assessment Guidance Note: A Summary Guide to Assessing the Additional Benefit, or Additionality, of an Economic Development Project or Programme*. [online]. Glasgow: Scottish Enterprise. Available from: [https://www.scottish-enterprise.com/~/\\_/media/SE/Resources/Documents/ABC/additionality-and-economic-impact-assessment-guidance.pdf](https://www.scottish-enterprise.com/~/_/media/SE/Resources/Documents/ABC/additionality-and-economic-impact-assessment-guidance.pdf) [accessed 30 January 2015].

Seafish (2006) 'The economic impacts of the UK sea fishing and fish processing sectors: An input-output analysis'[online]. Edinburgh: Seafish Authority. Available from:

[http://www.seafish.org/media/Publications/2006\\_I-O\\_Key\\_Features\\_Final\\_090108.pdf](http://www.seafish.org/media/Publications/2006_I-O_Key_Features_Final_090108.pdf)  
[accessed 02 August 2015].

Seafish (2015) Email from T. Yordanova 03 July.

Surís-Regueiro J.C., Garza-Gil M. D. and Varela-Lafuente M. M. (2014) 'Socio-economic quantification of fishing in a European urban area: The case of Vigo' *Marine Policy* 43 p.347–358.

Teh L.S.L., Teh L.C.L. and Sumaila U. R (2011) 'Quantifying the overlooked socio-economic contribution of small-scale fisheries in Sabah, Malaysia' *Fisheries Research* 110 pp. 450–458.

University of Strathclyde (2002) *Input-Output Multiplier Study of the UK and Scottish Fish Catching and Fish Processing Sectors* [online]. Glasgow: University of Strathclyde. Available from:

[http://www.seafish.org/publications-search?search=fish&category=Economics%20and%20Business&date\\_month=&date\\_year=&published\\_beforeafter=](http://www.seafish.org/publications-search?search=fish&category=Economics%20and%20Business&date_month=&date_year=&published_beforeafter=) [accessed 06 July 2015].