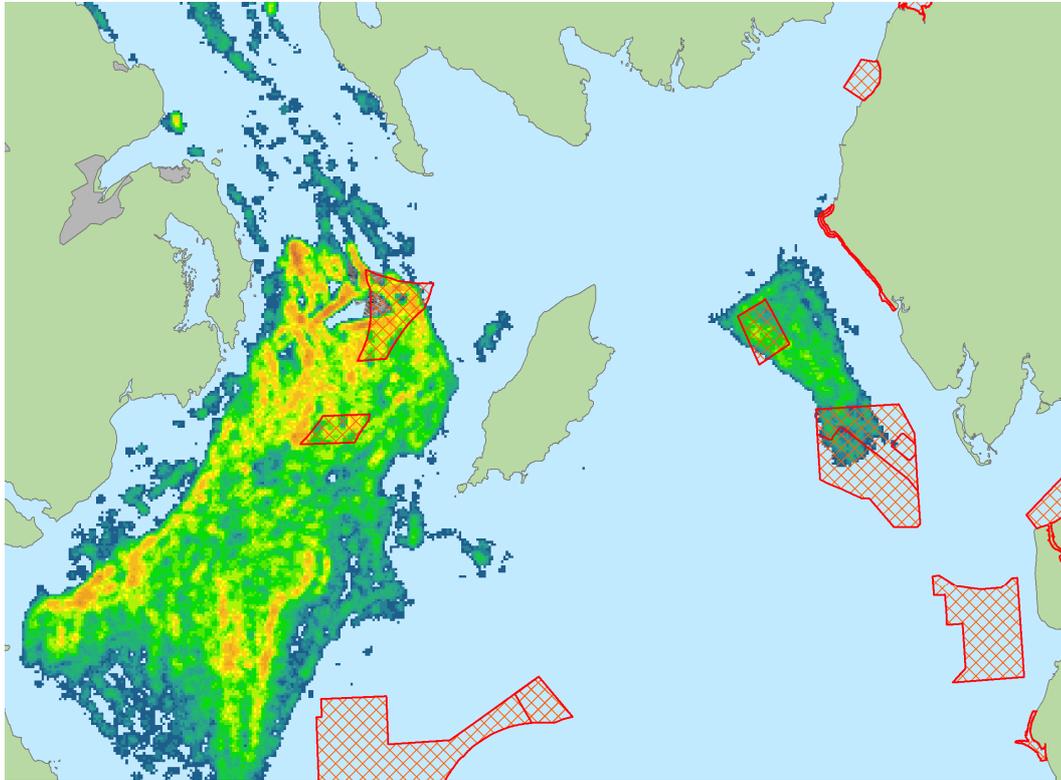


THE VALUE OF IRISH SEA MARINE CONSERVATION ZONES TO THE NORTHERN IRISH FISHING INDUSTRY



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Report to:

Seafish Northern Ireland Advisory Committee (SNIAC)



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Cappell, R., Nimmo, F. Rooney, L. "The value of Irish Sea Marine Conservation Zones to the Northern Irish fishing industry" Poseidon Report to the Seafish Northern Ireland Advisory Committee.

EXECUTIVE SUMMARY

This report is by Poseidon Aquatic Resource Management Ltd at the request of the Seafish Northern Ireland Advisory Committee (SNIAC) and was funded by Seafish. The Northern Ireland Department for Agriculture and Rural Development (DARD) provided VMS & landings data and the Agri-Food and Biosciences Institute (AFBI) analysed the VMS data to determine fishing effort.

The Irish Sea Conservation Zone project has now recommended 19 Marine Conservation Zones (hereafter called rMCZs) to the UK Environment Minister. Additional research has been requested and a decision on what rMCZs to take forward for consultation is expected this year (2012).

Current management proposals include the closure of MCZs to 'benthic fisheries', implying a ban on the use of bottom-trawled gear. For the Northern Ireland fleet this directly affects the whole prawn fleet, amounting to some 121 vessels (82% of the NI fleet over 10m). The NI trawl fleet almost exclusively targets *Nephrops* with a small by-catch of other species.

The NI fishing industry has a vested interest in a sustainable marine environment in the Irish Sea. Gear developments are being implemented to support the sustainable harvesting of the Irish Sea *Nephrops* stock. The industry hopes that appropriate management measures within the MCZ areas can be determined. However, this report focuses on the impact to the NI fishing industry (and dependent communities) of the management measures as currently proposed.

Value of landings from MCZ areas

The value of landings arising in each rMCZ was calculated by estimating the proportion of the monthly landings values per ICES rectangle that was caught within the rMCZ boundary. VMS data were used to estimate effort in the rMCZ and applied to landed value from the ICES rectangles containing the rMCZs. An additional detail taken into account for the estimated catch value in each rMCZ is the proportion of whole prawns per landing and the size of prawns. These product features are particularly significant for the deep-water grounds of South Rigg and Slieve Na Griddle, which are renowned for their higher proportion of large prawns that are landed whole.

Between 2007 and 2010 the estimated average value of Northern Ireland fleet landings of all species from MCZs 6, 7, 1 and 2 (see map on p.9) amounted to £1.2million.

The increase in prices seen in 2011 for tails and whole prawns (45% and 32% increases on 2010 prices respectively) would see this value increase substantially, illustrating the risk in determining impact based on a snapshot of absolute values rather than proportionate values.

For the Northern Irish trawl fleet the 2007-2010 average equates to 15% of total landings from the east, west and central Irish Sea areas. [The larger NI vessels do fish in other areas, e.g. West of Scotland, so their Irish Sea landings are not their total annual landings].

The single most valuable rMCZ for the NI fleet is South Rigg (MCZ6), accounting for 55% of total value from rMCZ areas.

The estimated total value relates to total landings of *Nephrops* and other species from the MCZ areas only. Industry consultation indicates that additional operational constraints (IFCA bylaws preventing twin rigging, wind farms and other un-trawlable areas) in combination with the imposition of restrictions in MCZ areas would substantially extend the areas where they were unable to fish.

The average annual value of *Nephrops* (or prawn) landings from these areas in recent years is not equivalent to the expected reduction in revenues if *Nephrops* fishing were not permitted in these areas. This is because vessel owners will replace some of the foregone revenues with activity in other areas, albeit potentially less profitable fishing areas in both the short and longer term.

It is important to highlight that not all revenues generated deliver the same rate of profit. In other words, although a certain sea area may generate e.g. 25% of revenues, it may generate more than that proportion of annual operating profit if, for instance, the catch rate or the average price per kg are typically higher than average for fishing in that sea area. This is certainly the case for MCZ6 (South Rigg) and MCZ7 (Slieve Na Griddle); areas that are renowned for larger, good quality prawns where a greater proportion can be landed whole rather than tailed.

Impact on Fleet Performance

The overall value of landings attributable to the MCZ areas is substantial, but its significance is evident when compared to fleet finances. Average operating profits of single rig and twin rig *Nephrops* vessels are highly variable year on year. Across the four years where data are available, for single rig vessels operating profit averaged 12% and net profit averaged 8%. Twin rig vessels (data for 2008 and 2009 only) show an average operating profit of 21% and net profit of 10%. It is assumed that the increase in prices for 2011 would result in improved profit levels.

On an individual vessel basis the estimated value of landings from the MCZ areas is an average of £9,500 per vessel. For single rig vessels this represents 63% of average operating profits and 91% of net profit. For some years the estimated value from the MCZ areas is found to exceed average profit levels. For the single rig fleet, around 80 vessels, the loss of such revenue would make operations unsustainable with some years being loss making and net profits insufficient for fleet re-investment.

For the twin-rig segment, the impact of losing revenue from MCZ areas would also be substantial. The estimated value of catch from MCZ areas per vessel represents 20% of operating profits and 40% of net profits, again affecting the financial viability of the fleet in the long term.

Displacement

NI skippers have indicated that closing the rMCZ areas 1 and 2 in addition to existing management and development constraints would make fishing on eastern Irish Sea grounds non-viable. This effort would probably therefore be displaced to grounds in the western Irish Sea or the Clyde.

The western Irish Sea grounds would be further limited with the closure of South Rigg (MCZ6) and Slieve Na Griddle (MCZ7). For the smaller vessels with a restricted range, there are few alternative grounds available, and none that provide the good quality large prawns found on the South Rigg and Slieve Na Griddle grounds. This group would therefore experience the greatest impact from current proposals.

Fishing patterns reflect the need to disperse effort across grounds throughout the year. Displacement from MCZ areas will cause additional pressure on the existing grounds that do remain open. Forcing vessels off the deep-water grounds will mean vessels fish inshore grounds harder, likely to cause lower catch per unit effort and may be unsustainable in the longer term.

Other Irish Sea development proposals, including inshore MPAs and extensive marine renewable development zones would further confine the fleet onto remaining accessible parts of grounds, risking unsustainable levels of effort on those grounds.

Socio-economic Impacts

The NI trawl fleet represents the vast majority of jobs in the NI catching sector and accounts for around 535 full time jobs. MMO figures for 2009 give 541 full time NI fishermen and 654 in total (full and part-time).

Around 80% of LWE prawn landings are tailed with the remaining 20% landed as whole prawns. Local scampi processors purchase nearly all (95-99%) of the tails landed by the fleet. Close to ¼ of whole prawns landed by the fleet are also purchased by these processors. These data show local marketing chains are highly dependent on the presence of a few local processors as buyers; there

is a co-dependence between the NI fleet and NI processors. The NI processing sector employs around 500 FTE staff.

With less supply available from the local fleet, processors would have to source a greater proportion from elsewhere, mainly Scotland, England and the Republic of Ireland. The strategic benefit of being located at the Northern Ireland ports would be diminished. For many companies with UK mainland premises, consolidation at those premises more likely.

If the NI processors closed, NI vessels would land less of their remaining catch into Northern Ireland's ports and instead land to the remaining processors in South West Scotland and Cumbria creating a cycle of decline in Northern Ireland's main fishing ports of Ardglass, Kilkeel and Portavogie. These show a very high level of dependency on fishing employment (19.7%, 9.6% and 39.5% of total local employment respectively), which is higher still when upstream and downstream industries are taken into account, such as employment in scampi processing.

Input-output analysis carried out for Seafish estimated that if the value at first sale of shellfish landings decreased or increased by £1 million, the expected short term impacts on the wider UK economy would be:

- UK Output would change by £7.16 million;
- UK Employment would change by 113 FTE jobs;
- UK GDP would change by £2.57 million.

As the NI processing industry retains nearly all NI fleet landings, the impacts on the UK economy from reductions to NI landings can be expected to predominantly occur in Northern Ireland. The estimated annual value of NI landings from the rMCZ areas averages £1.2 million. 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.

The Irish Sea MCZ Project Impact Assessment

The Irish Sea MCZ Impact Assessment is on a UK-wide basis, while this report focuses on the Northern Irish fleet and associated socio-economic links. Due to this difference in scope and various methodological differences a direct comparison of values is not appropriate.

The IA was not published in July 2012, after the Irish Sea MCZs were recommended. Stakeholder negotiations could not therefore be fully informed of comparative social and economic impacts when developing recommendations with limited, if any, consideration of alternative sites.

The IA options are based on very limited fishing/no fishing management measures; these are not in line with Defra's policy encouraging various measures with the least social and economic impact.

The IA produced values that are not supported by the reported landed value per ICES rectangle, at least for some MCZ areas. Without access to the data used, the basis for these values is unknown and puts the overall valuation and findings of the IA into question.

Further work

Due to the substantial impacts on the sector and the region, further exploration of appropriate management measures, alternative sites and amendments to boundaries is needed. This should be with a view to deliver habitat protection based on specific objectives while minimising the resulting social and economic impact.

With the potential impacts of renewable energy development proposals and additional Marine Protected Areas under the NI Marine Bill in NI inshore waters, there is an urgent need for a more joined-up approach to Irish Sea management.

1 INTRODUCTION

1.1 REPORT BACKGROUND

This assessment by Poseidon Aquatic Resource Management Ltd explores the economic importance to the Northern Ireland fishing industry of the proposed Marine Conservation Zones (MCZs) in the Irish Sea.

The research was requested by the Seafish Northern Ireland Advisory Committee (SNIAC) and funded by Seafish. The work has been supported by the Northern Ireland Department for Agriculture and Rural Development (DARD) and the Agri-food and Biosciences Institute (AFBI) with the provision of data on landings and fishing vessel activity.

The Irish Sea Conservation Zone project has now recommended 19 MCZs (hereafter called rMCZs) to the UK Environment Minister. Additional research has been requested and a decision on the rMCZs to take forward for consultation is expected before the end of 2012.

The Northern Ireland fishing industry has expressed serious concern for the future viability of the industry should current MCZ proposals for the Irish Sea be implemented. The consensus amongst the industry is that MCZs would result in major negative impacts on many sections of the fleet, and a number of MCZs (see figure 1) would result in a disproportionately large impact on the Northern Irish industry.

The NI fishing industry has a vested interest in a sustainable Irish Sea. Gear developments are being implemented to support the sustainable harvesting of the Irish Sea *Nephrops* stock. The industry hopes that appropriate management measures can still to be determined for the MCZ areas that deliver the conservation objectives without a need to close areas to 'benthic fisheries'. However, this report focuses on the impact to the NI fishing industry (and dependent communities) of these management measures as currently proposed.

1.2 OBJECTIVES

The objective of this work is to illustrate the level of dependence of the Northern Ireland fishing industry on the MCZ areas proposed.

This study presents a realistic and justifiable estimate of the economic impact of current proposals, namely the closure of rMCZs to 'benthic fisheries'. For the Northern Ireland fleet these proposals affect the whole prawn fleet, which exclusively targets *Nephrops norvegicus*, amounting to 121 vessels (82% of the over 10m fleet).

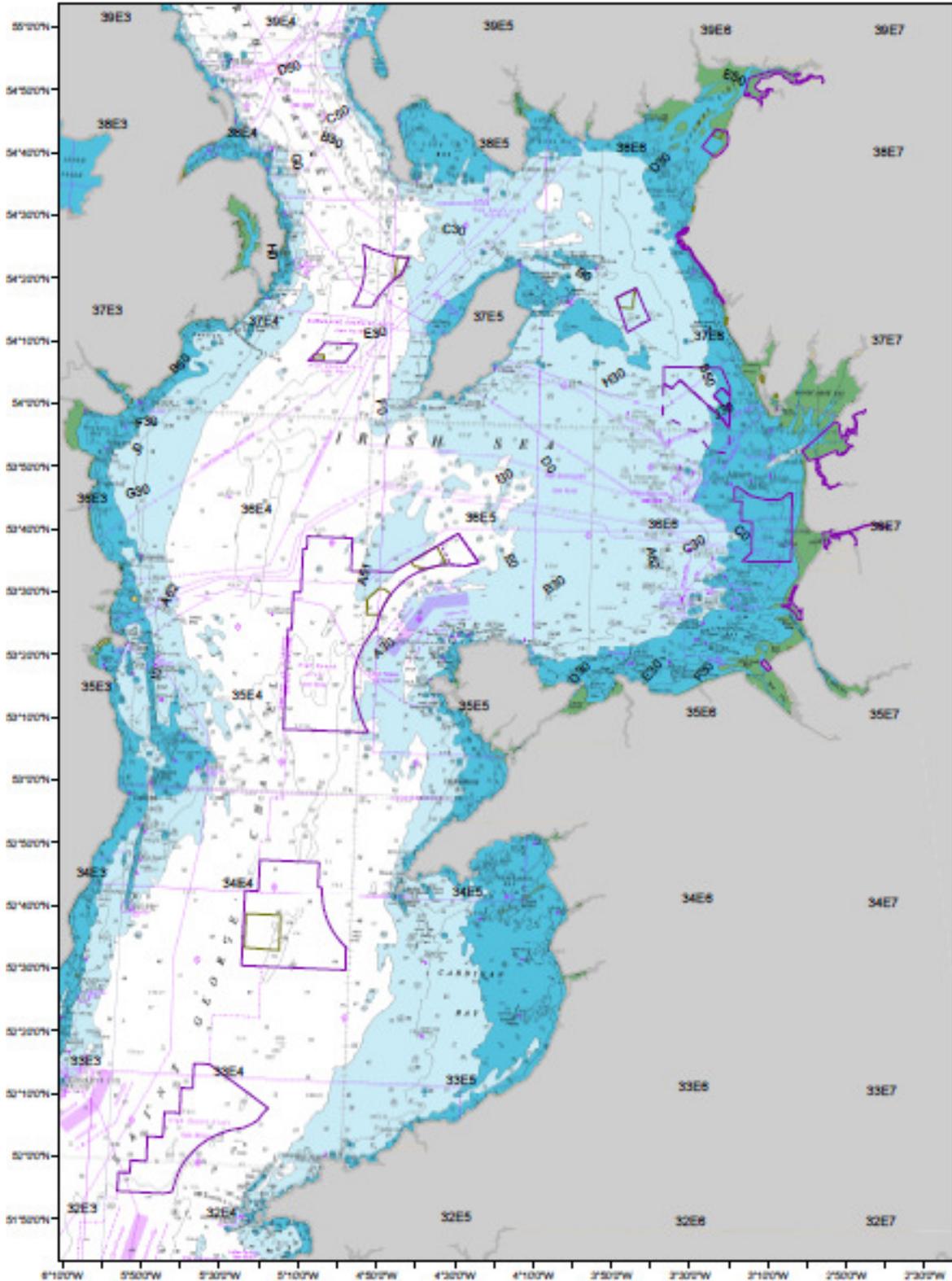
The report:

1. Estimates the proportion of total fleet revenue associated with the proposed areas*; and
2. Assesses the socio-economic impacts on the fleet and dependent land-based sectors.

* Total fleet revenue is based on the total annual value for the relevant MCZs, which varies year on year due to various factors affecting the fleet's fishing opportunities & market prices.

The report does not explore the numerous other issues raised during consultation with the industry (some of which are noted in 1.3 below).

Figure 1 Recommended Irish Sea Marine Conservation Zones (rMCZs)



Source: Irish Sea Conservation Zone project

1.3 WIDER CONCERNS WITH MCZS

Consultation with the Northern Irish fishing industry as part of this work identified a number of issues regarding the specific proposals including:

- The identification of potential alternative locations of interest features that would not impact the fleet to such a significant extent;
- The need to ban gears that have fished the areas in question for decades and the features in question continue to be present;
- The prevention of trawling in the areas may result in the loss of the features that the MCZs are seeking to protect;
- The lack of alternative fishing areas for the Northern Ireland fleet;
- Closing these specific areas to trawling will move effort from a sustainable fishery onto grounds and other fisheries that may be unable to sustain it;
- The need to consider the efforts being made by the fleet to reduce benthic impacts via semi-pelagic trawl doors and lighter gear;
- The reduction in vessel numbers and overall effort over the last decade, which further reduces the impact of fishing in these areas;

The above issues have not directly informed this valuation exercise, but are noted as additional reasons why the industry is against the MCZs as currently recommended. These should be considered when assessing alternatives for the rMCZs and when considering the wider objective; the sustainable management of the Irish Sea ecosystem.

There were also a wide range of on-going and emerging constraints on the NI fleet that add to the negative impacts on fleet operations:

- Existing & additional proposed environmental designations in the inshore and offshore waters, such as inshore MPAs as part of the NI Marine Bill;
- Renewable energy development, in particular the position of Irish Sea developers (inconsistent with other developers) in relation to co-location of wind farms and MCZs and the continuation of fishing operations within wind farm sites.
- Major pipeline and cable developments across several parts of the Irish Sea
- The effort limits and closed areas that continue to be imposed under the Cod Recovery Plan

The above issues are important when considering the cumulative impacts on the NI fleet.

2 APPROACH

2.1 APPROACH

To estimate, as accurately as possible, the value to the Northern Ireland fleet of specific proposed MCZ areas through:

- a. **Fishing effort data** & information mapped against the rMCZs to establish the proportion of effort associated with these areas;
- b. **Landings and sales data** to establish the comparative value of landings from the MCZs;
- c. **Cost and earnings data** to determine how far the revenue attributable to the MCZs contributes to fleet economic performance.
- d. Exploring the potential **socio-economic consequences** of any loss of revenue.

2.2 SCOPE

The scope of this assessment is limited to:

- The Northern Ireland trawl fleet (*Nephrops* is the main target species, but whitefish and other species make up important additional components). The impact on Northern Ireland's other fleet segments (scallop dredge, pelagic and potting fleets) and vessels from other regions and countries that fish in the MCZs are not included.
- The value of catch associated with rMCZs 6 (The South Rig) & 7 (Slieve na Griddle) between the Northern Irish coast and the Isle of Man; rMCZs 1 & 2 in the Eastern Irish Sea off Whitehaven); and rMCZ 3 in the central Irish Sea. The impact of the other Irish Sea rMCZs on this fleet, such as the additional displacement from these other areas is not included.
- Effort data from the years 2006 to 2010. This enables a five-year average and short-term trends to be established, but it should be noted that this period includes the global economic downturn, which severely impacted the export-orientated trade in *Nephrops*. Effort limitations (days at sea) have also been in place for the entire period as part of the cod recovery plan for the Irish Sea. Price analysis (section 4.3) shows the expected upturn in value of the *Nephrops* grounds with substantial price increases in 2011.

2.3 METHODOLOGY

2.3.1 Fishing effort

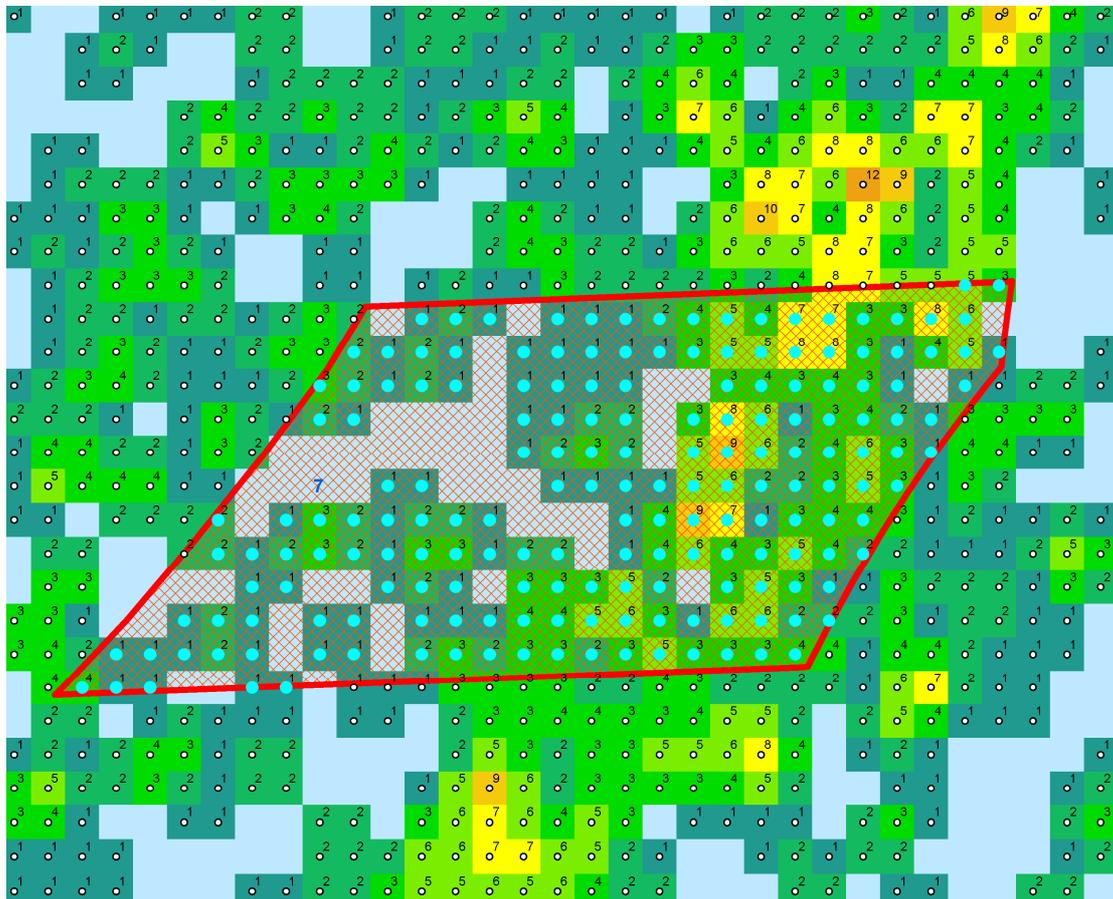
Effort is established in two ways: for the over 15m fleet using VMS data and for the under 15m fleet through consultation.

VMS data on the over 15m fleet were provided by DARD for the years 2006 to 2010 and interpreted in GIS by AFBI using a standardised approach¹. The data were presented anonymously for data protection purposes and therefore could not be readily translated into fishing effort in kilowatt hours as point to point readings could not be established. Instead a proxy for fishing effort must be used, 'fishing intensity'.

¹ *Fishing Intensity Analysis using Vessel Monitoring System (VMS) data. AS_MARIM_021_V1 – Laurence Rooney (AFBI).*

VMS data points for each year were filtered down to "fishing" data points - using speed as an indicator. Speeds greater than 2 knots and less than 6 knots were designated as fishing. Exclusions were made around the ports and in some of the loughs where mussel dredging was recorded. Point density analysis was then carried out by AFBI using ArcGIS on each years total fishing data. Figure 2 presents an example of this analysis for Slieve na griddle, March 2010. The total pings/km2 is the sum of value of each of the points within the MCZ.

Figure 2 Example of point density analysis to determine fishing intensity



source: AFBI

The activity per MCZ and ICES area was then summed for all areas containing an MCZ site to give a comparative level of activity in each MCZ.

For the under 15m fleet, industry consultation was used to establish fishing patterns, i.e. day boats operating no further than 20 nmiles from port. This established that the Portavogie, Ardglass and Kilkeel under 15m fleet is limited to the trawl grounds associated with rMCZ 6 and rMCZ 7. Based on this consultation, an assumption is made that the location of fishing activity of the under 15m vessels in the Western Irish Sea is the same as that established for the over 15m fleet.

2.3.2 Landings and sales data

Landings data were provided by DARD for the years 2006-2010 by species, vessel category (under 15m and over 15m), home port and ICES rectangle.

The value of landings per MCZ is calculated by applying the estimated fishing intensity per MCZ as a proportion of total estimated activity in the ICES rectangle to the value of catch per ICES rectangle. Where an MCZ spans more than one ICES rectangle, the fishing intensity for each ICES

rectangle is calculated separately before being summed. For each MCZ being considered the following is calculated:

Value of catch within MCZ = total value per ICES rectangle \times % effort per ICES rectangle in MCZ

The above provides a better resolution to the data usually used, but still works on the assumption that the value of catch is consistent and is a function of fishing effort, i.e. catch per unit effort is constant. In reality this is not the case, but a precise catch value per area is impossible to establish across a fleet with the currently available data.

For the great majority of Northern Ireland's fleet, *Nephrops* is the main target species and has amounted to between 33% and 45% of total landed value from the three ICES rectangles containing MCZs 1,2, 6 and 7. The catch from these MCZs, particularly from the deeper water grounds of 6 & 7, are known to be of a generally larger size and a better quality. This has major implications for the value of the catch, suggesting that applying an average price to these areas would underestimate their true value. By using prices specific to catches from the area (averaged for the year), some differences in size and quality can be taken into account.

Data from sales agents is used to determine the proportion of whole prawns landed from these areas as compared to other areas. The landings into Portavogie, dominated by day boats that are limited to fishing the areas in and around 6 & 7 are considered against landings (by NI vessels) fishing on grounds further away. In this case landings to Campbeltown, consisting of vessels fishing further north in the Irish Sea and the Clyde, are used for comparison.

The ratio of whole to tailed *Nephrops* is then used to apply the relevant prices and determine the value of *Nephrops* attributable to these MCZ areas.

2.3.3 Costs and earnings data

The Seafish economic survey of the UK fleet provides evidence of the economic performance of the key segments of the Northern Ireland fleet. This information is only available for 2006, 2007, 2008 and 2009. According to recent industry estimates (Tingley, D., 2009), in 2009 there were:

- 6 semi-pelagic whitefish trawlers
- 44 twin-rig *Nephrops* trawlers
- 42 single rig *Nephrops* trawlers >15m
- 40 single rig *Nephrops* trawlers <15m

The profitability per fleet segment is presented and the likely impact of loss of revenue from the MCZ areas is discussed.

2.3.4 Socio-economic consequences

The number employed across the fleet is estimated and the implications of the proposals for fleet employment are discussed. For any fleet impact, there are also inevitable knock-on effects for upstream (suppliers) and downstream (buyers) businesses. These all contribute to indirect impacts on the wider communities associated with those businesses.

The full socio-economic consequences of the proposals are difficult to determine as the true extent to which the fleet can source alternative fishing opportunities and the impact on overall profitability is not known. However, the dependence of NI processors on local landings and the consequences of reduced landings is presented using industry purchasing data and Seafish input-output analysis for multipliers.

2.4 ASSUMPTIONS

It is not possible to establish the precise value of landings specific to the rMCZs. Logsheets for the over 10m fleet report the weight of landings on the basis of ICES rectangles. These are comparatively large sea areas that do not give sufficient detail for the rMCZs. Therefore some level of assumption must be made to establish the value of landings attributable to these areas. The approach described above uses best available information on fishing effort and value of Nephrops, but inevitably assumptions are used to link the two as described below.

The value of landings reported in official statistics is also based on average prices. The data used in this report are actual sales from Northern Ireland fish sales agents and purchases by Northern Irish *Nephrops* processors. The data presented uses landings into Portavogie and landings into Campbeltown. The assumption, based on industry consultation is that landings into Portavogie are predominantly from the South Rigg area (rMCZ 6) and landings into Campbeltown are by vessels fishing in the Clyde. A further assumption that has been corroborated through industry consultation is that catches from the Slieve Na Griddle ground (rMCZ 7) are similar in composition to those in the South Rigg area.

The effort data from VMS is provided as two-hourly 'pings'. This is then filtered to vessels showing speeds of between 2 and 6 knots. The assumption is that vessels moving between 2 and 6 knots are fishing; those above are steaming. This is a standard approach, but is not faultless (high activity being recorded in the mouth of ports for example). A further filter has therefore been used to remove activity within 1km of port and in various sea loughs with mussel dredging activity.

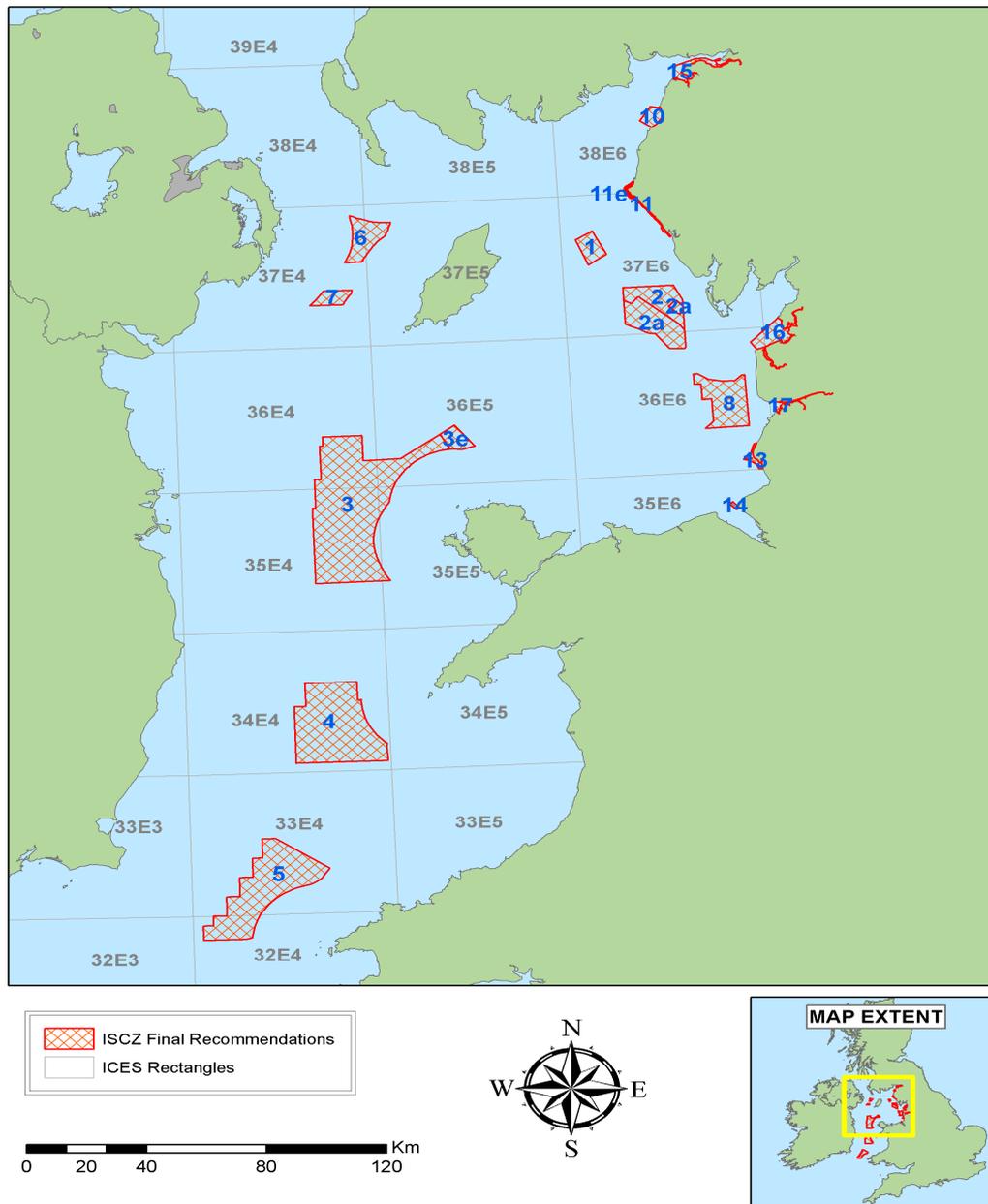
For the under 15m fleet without VMS data, it is assumed that the geographical limitations of the vessels, as established through consultation, limits all fishing effort by this day-boat fleet to the prawn grounds between home ports and the Isle of Man.

3 FISHING EFFORT DATA

3.1 INTRODUCTION

Data from the Vessel Monitoring Systems (VMS) onboard 15m+ vessels in the Northern Ireland fleet were provided by DARD for the years 2007 to 2010. These were then interpreted by AFBI and entered into a GIS system to establish fishing intensity. The tables and figures on the following pages present the outputs from AFBI's analysis.

Figure 3 Location of MCZ areas within ICES rectangles



source: AFBI

- MCZ 6 South Rigg is located within ICES rectangles 37E4 and 37E5.
- MCZ 7 Slieve Na Griddle is within ICES rectangle 37E4
- MCZ1 Mud Hole is within ICES rectangle 37E6

- MCZ2 West of Walney is within ICES rectangle 37E6

Table 1 below shows the level of fishing effort within the MCZs compared to the ICES rectangles containing them. The trends in the proportion of fishing capacity within the MCZs are relatively stable over recent years, showing slight increases in South Rigg, Mud Hole and the Co-location areas and slight reductions at Slieve Na Griddle and West of Walney.

Note: these totals relate to the MCZ areas only, industry consultation indicates that additional operational constraints (IFCA bylaws preventing twin-rigging, windfarms and proximity to unsuitable trawl areas) would effectively increase the areas effectively closed to fishing.

Table 1 NI fleet fishing intensity within MCZs, 2007-2010

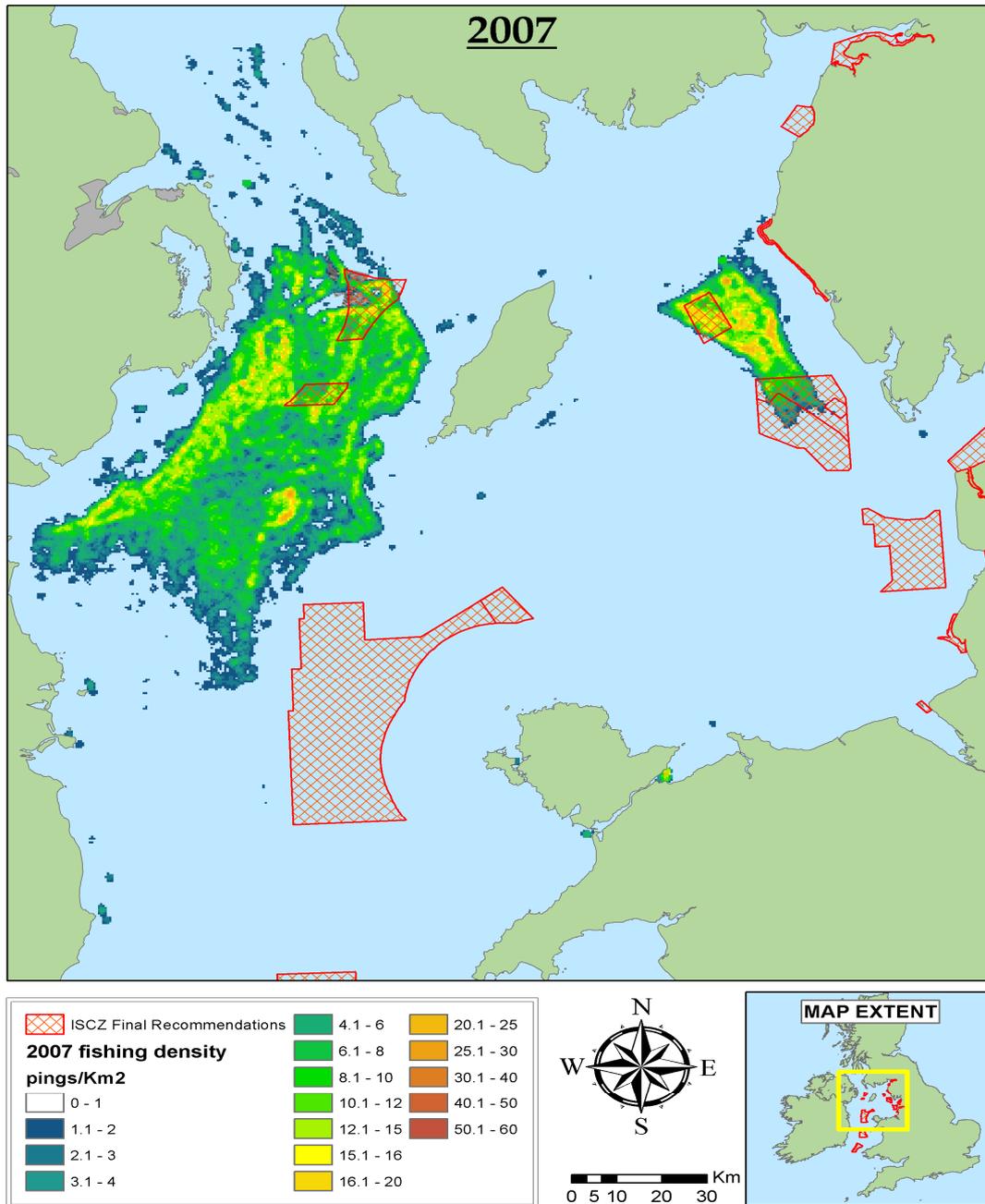
MCZ	ICES	% of MCZ fishing intensity within rectangle					Average 2007- 2010
		2007	2008	2009	2010		
South Rigg	6 37E4&37E5	6%	5%	7%	7%	6%	
Slieve Na Griddle	7 37E4	4%	3%	3%	3%	3%	
Mud Hole	1 37E6	15%	14%	16%	16%	15%	
West of Walney	2a 37E6	8%	9%	9%	5%	8%	
Co-location	2b 37E6	3%	5%	5%	5%	4%	

Source: AFBI/Poseidon

3.2 SEASONALITY IN EFFORT

The landed value varies considerably from month to month (see Figure 8), this is in part related to the changes in fishing patterns that are seen on a seasonal basis. Therefore a further refinement of the analysis of 2010 VMS data was undertaken by AFBI to determine fishing intensity by month. Maps presenting monthly fishing intensity in 2010 are presented in appendix A.

Figure 4 Map showing fishing intensity in relation to MCZ areas for >15 fleet, 2007



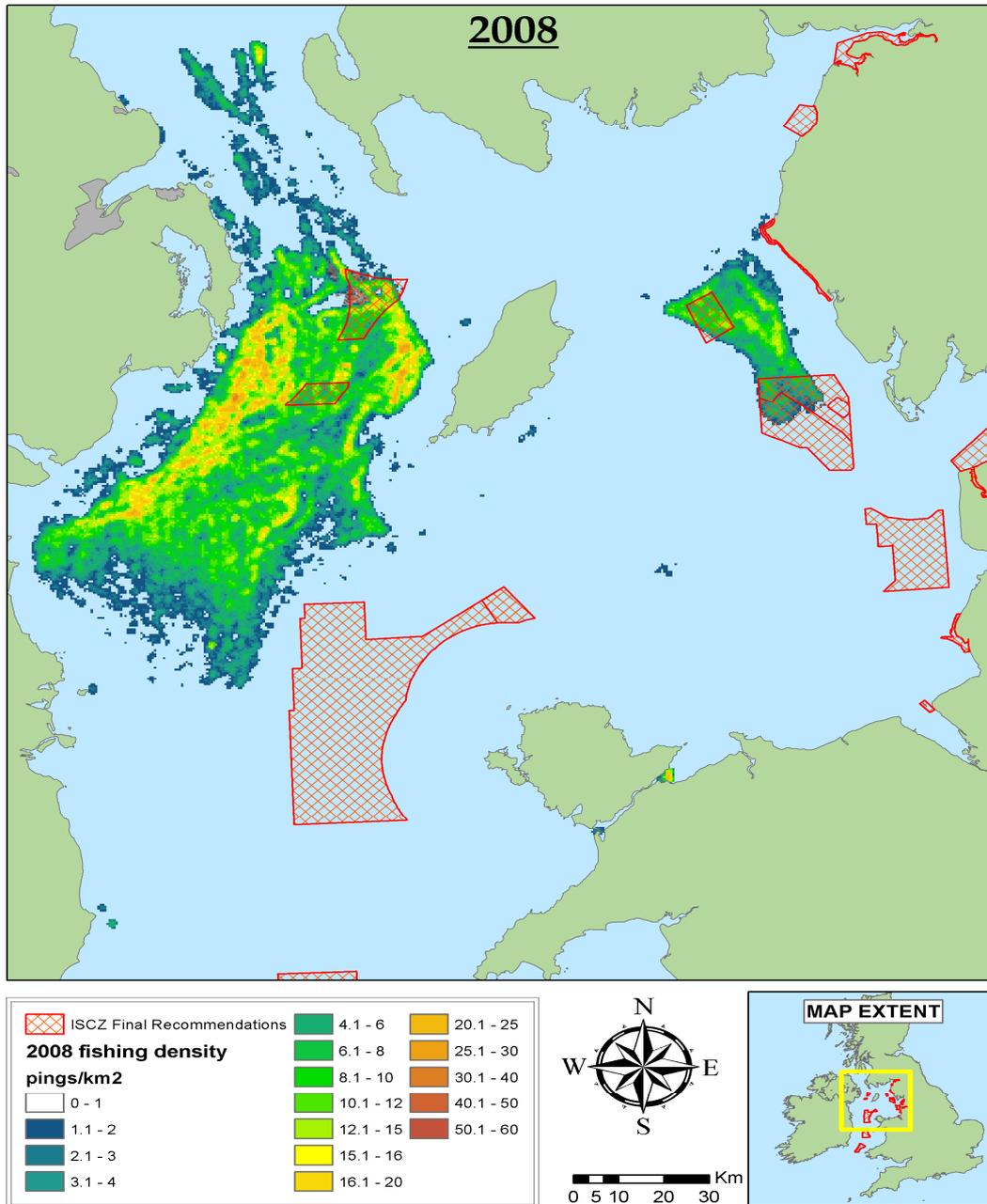
source: AFBI

Total VMS	count	33220
	mean	4.60
	total	152949

MCZ VMS	count	1977
	mean	6.82
	total	13473.4

% intensity in MCZ **8.8**

Figure 5 Map showing fishing intensity in relation to MCZ areas for >15 fleet, 2008



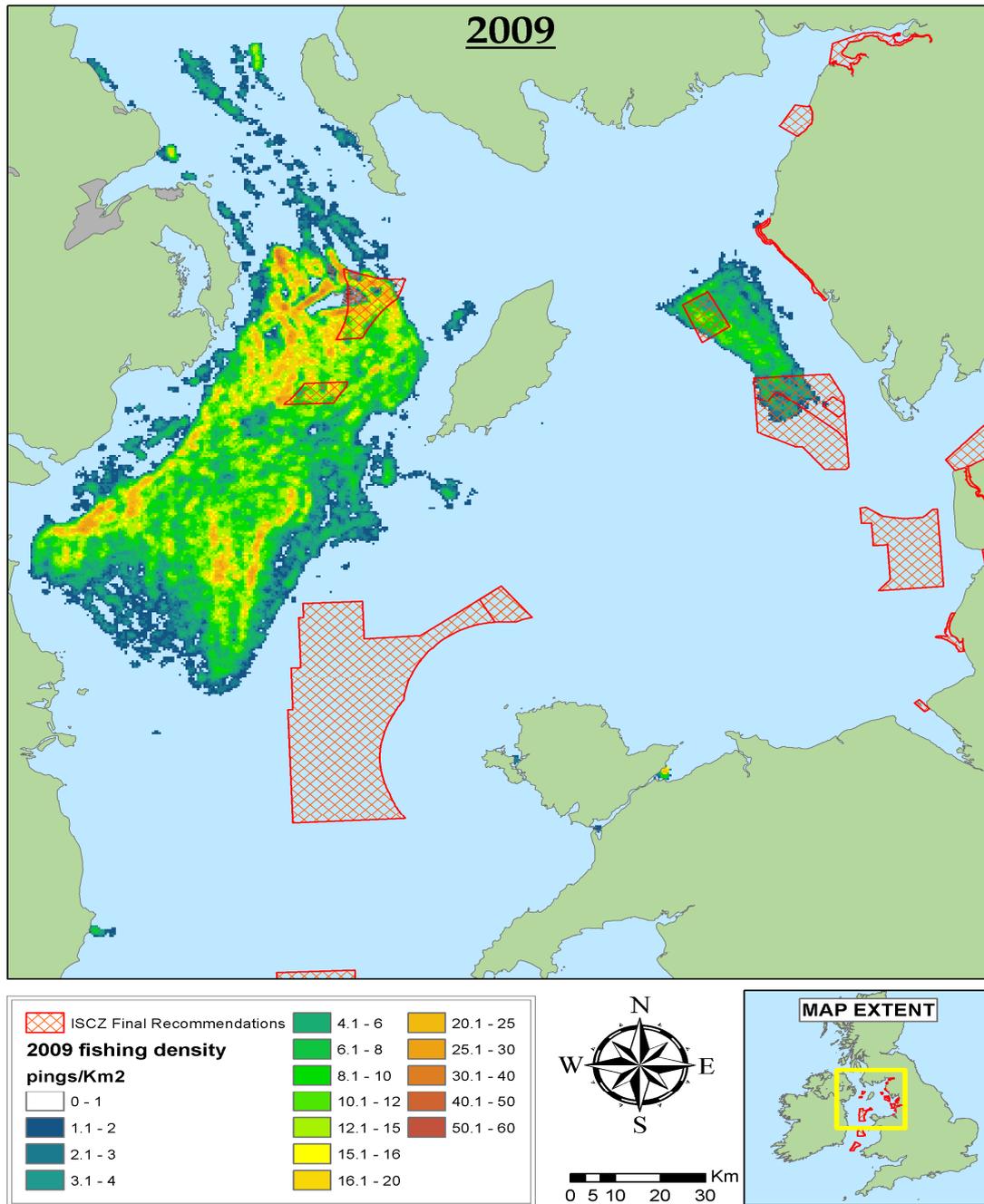
source: AFBI

Total VMS	count	36045
	mean	4.96
	total	178765.38

MCZ VMS	count	1851
	mean	5.97
	total	11162.49

% intensity in MCZ 6.24

Figure 6 Map showing fishing intensity in relation to MCZ areas for >15 fleet, 2009



source: AFBI

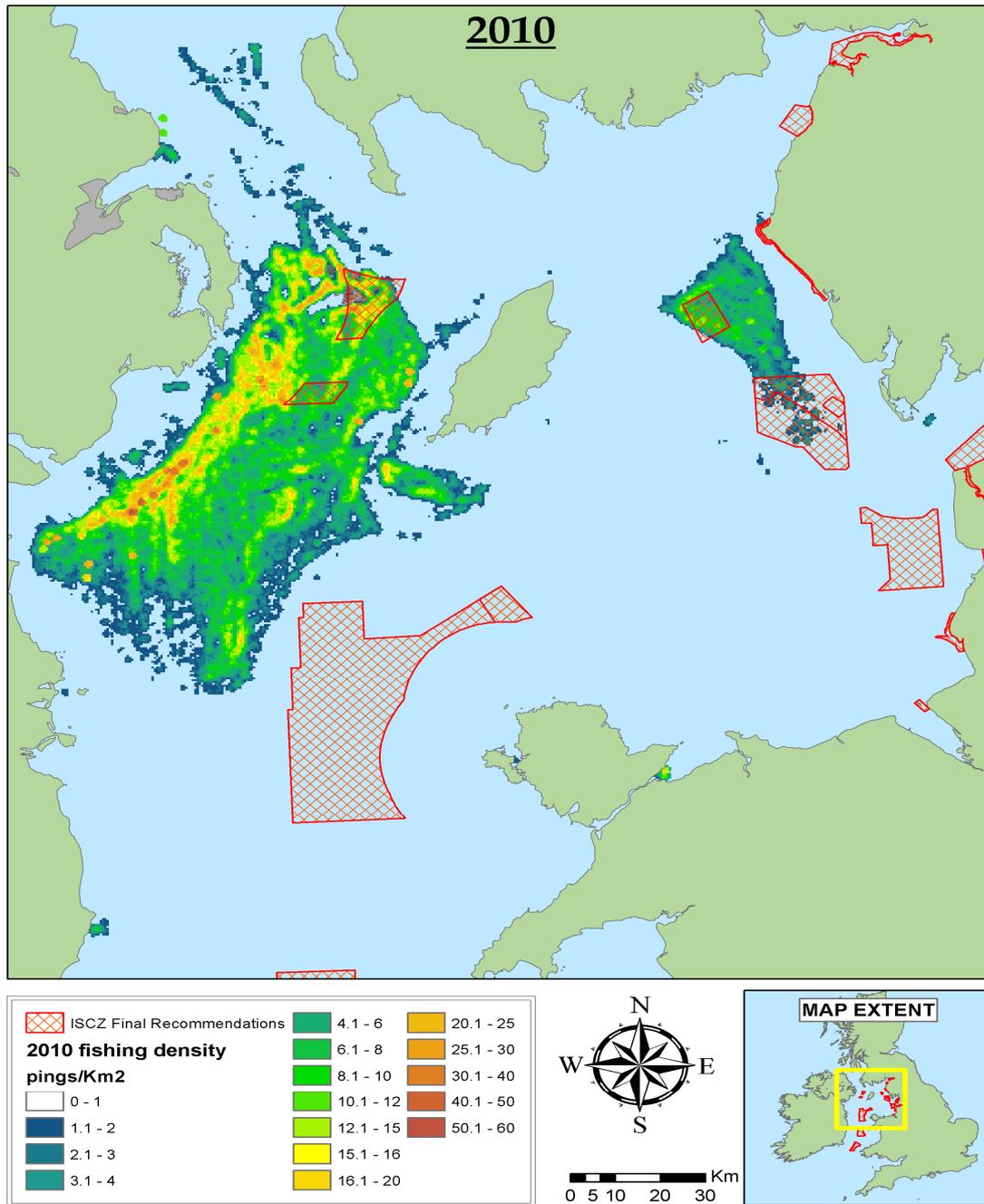
Total VMS	count	35874
	mean	5.81
	total	208296

MCZ VMS	count	1941
	mean	7.22
	total	14011.05

% intensity in MCZ

6.73

Figure 7 Map showing fishing intensity in relation to MCZ areas for >15 fleet, 2010



source: AFBI

Total VMS	count	35781
	mean	5.08
	total	181755

MCZ VMS	count	2062
	mean	5.31
	total	11047.58

% intensity in MCZ

6.08

4 ESTIMATED CATCH VALUE PER MCZ

DARD provided Poseidon with total landings values per species per ICES rectangle, per month for the years 2006-2010. When these are applied to the fishing intensity data presented in the previous section, a value per MCZ can be established. Section 4.1 presents this data and illustrates the strong seasonality seen in landed values.

By applying the monthly landings values per ICES rectangle to the monthly fishing effort per MCZ (calculated by AFBI for 2010), a value to the fleet per MCZ can be established. This value, taking seasonality of effort and catches into account, is more accurate than simply estimating value on an annual basis.

A further distinction for the estimated catch value in each area is the proportion of whole prawns per catch, the size of prawns or any differences in quality. These variables are distinguished in the market price and section 4.2 presents the value of landings based on the real prices achieved for whole and tailed prawns from these specific areas or comparable areas.

4.1 SEASONALITY IN LANDINGS

The figures below illustrate the strong seasonality of Northern Ireland fisheries. This seasonality is reflected in total landings (Figure 8).

Figure 8 shows a large peak in total landings in the western Irish Sea (37E4) over the summer months with more fishing across the inshore and the over 10m fleet. A smaller spring peak is also evident in 37E4. For the eastern Irish Sea (37E6), a peak in landings is seen in April and May, while landings from the central Irish Sea (37E5) fluctuates through the year.

Figure 8 Seasonality of landings (tonnes) by the NI fleet per ICES rectangle, 2010

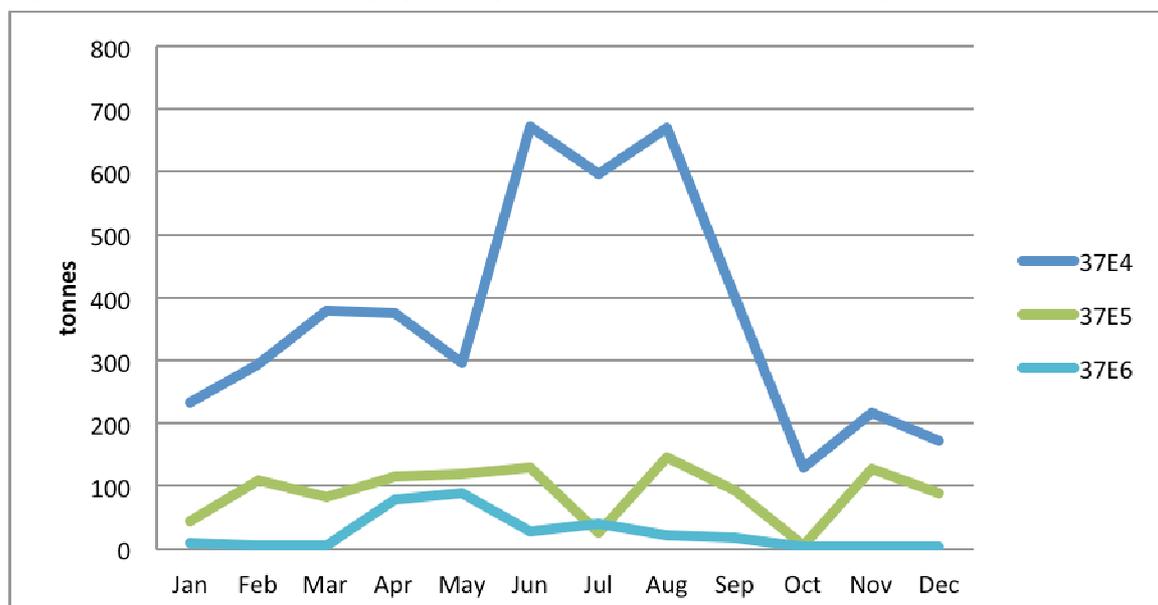
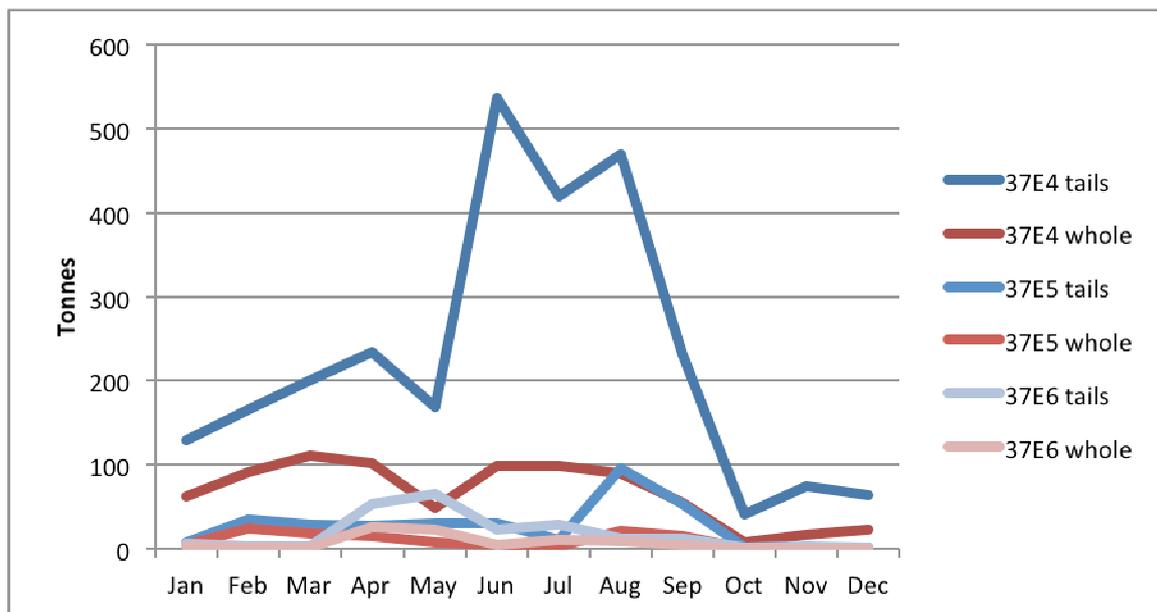


Figure 9 Seasonality of *Nephrops* landings (tonnes) by the NI fleet by ICES rectangle

source: DARD

Figure 9 illustrates the seasonality in the landings of tails and whole *Nephrops* in the ICES rectangles that contain the MCZs where the Northern Irish fleet operate. The large summer peak in 37E4 includes the significant summer fishery in the shallow sea area off Dundalk (see fishing intensity maps in Appendix A). However significant fishing on Slieve Na Griddle and in particular on the South Rigg grounds continue. The proportional fishing intensities on the South Rigg in August, September and October are 7.9%, 10.4% and 11.1% respectively compared to the annual average of 6.6% indicating that relatively more fishing effort is occurring in these areas over the peak months.

Of note is the comparatively high proportion of whole *Nephrops* within the first peak in March and April in 37E4. The importance of the South Rigg and Slieve Na Griddle grounds within these seasonal figures is evident as the AFBI analysis shows that the level of fishing intensity within the MCZ areas in these months is above the annual average.

4.2 LANDINGS PER ICES RECTANGLE

Table 2 and Table 3 present the total landings per rectangle by the Northern Ireland fleet. These range from just over £10 million in 2006 to £12.4 million in 2008 with a five year average of £11 million. Comparing the two tables shows the NI fleet's very high dependence on *Nephrops*, which between 2006 and 2010 represented an average of 42% of total fleet landings by volume and 69% by value.

Table 2 Total NI fleet landings per ICES rectangle

	2006		2007		2008		2009		2010		Average	
	Tonnes	Value (£)	Tonnes	Value (£)								
37E4	4,251	£6,505,415	5,406	£7,975,105	5,656	£8,920,056	5,715	£7,313,517	5,584	£7,412,519	5,322	£7,625,322
37E5	4,998	£2,592,157	4,012	£2,050,340	4,931	£2,439,090	4,446	£2,272,219	4,335	£2,484,351	4,544	£2,367,631
37E6	501	£988,207	808	£1,624,169	587	£1,042,143	556	£817,453	380	£580,851	567	£1,010,564
Total	9,751	£10,085,779	10,226	£11,649,614	11,173	£12,401,289	10,717	£10,403,188	10,299	£10,477,721	10,433	£11,003,518

Source: DARD

Table 3 NI fleet *Nephrops* landings per ICES rectangle

	2006		2007		2008		2009		2010		Average	
	Tonnes	Value (£)	Tonnes	Value (£)								
37E4	2,651	£4,763,809	3,031	£5,733,682	3,805	£6,942,341	3,678	£5,358,626	3,540	£5,479,999	3,341	£5,655,691
37E5	673	£1,270,547	638	£1,221,806	669	£1,258,211	636	£971,864	460	£776,162	615	£1,099,718
37E6	391	£820,216	656	£1,419,087	445	£868,172	464	£709,082	306	£482,254	452	£859,762
Total	3,715	£6,854,571	4,325	£8,374,576	4,919	£9,068,724	4,777	£7,039,573	4,306	£6,738,415	4,408	£7,615,172

Source: DARD

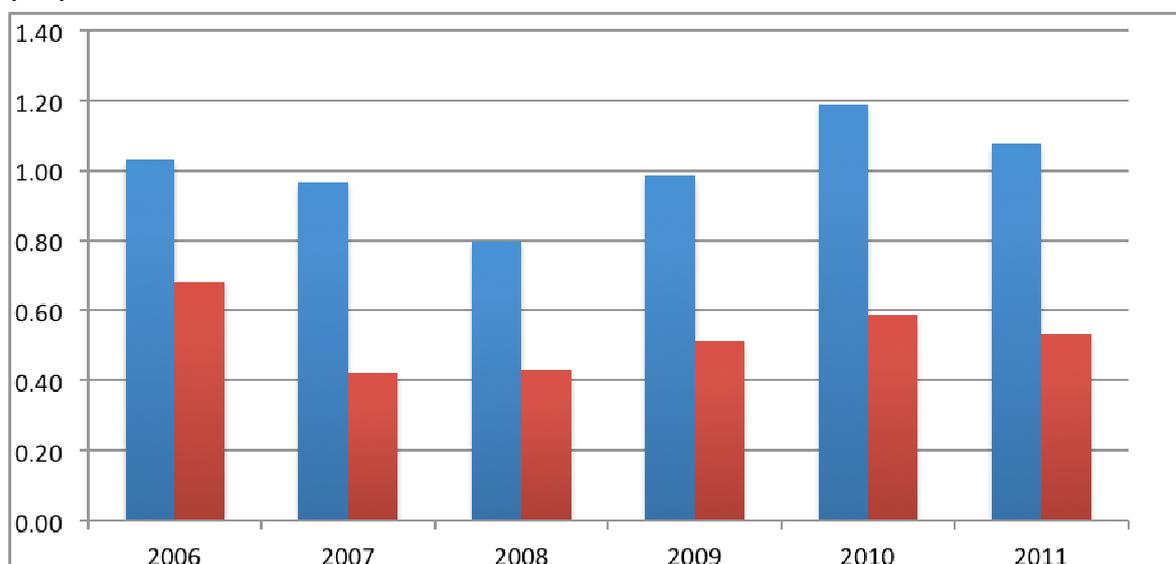
4.3 VALUE BASED ON REAL PRICES

If the estimated value of landings from MCZs were to be based only on average *Nephrops* prices that would underestimate the real value of *Nephrops* caught in the MCZs.

Nephrops is landed as whole animals and as tails, where the tail portion is retained and the remainder of the animal discarded. To calculate the live weight equivalent (LWE)² of *Nephrops* that is landed as tails, a 3:1 conversion factor is used, i.e. the landed tail weight is multiplied by 3 to estimate the total weight of whole prawns.

Considering the proportion of whole prawns within the catch and the higher price achieved for whole prawns compared to the LWE price for tails (1/3 of the tails price per kg with the 3:1 conversion factor is used) helps to better reflect the true value of landings from within the MCZs. Adding this detail results in higher prices (and so overall value) for MCZs 6 and 7 (areas 37E4 and 37E5), while the greater proportion of tails from MCZs 1 and 2 in the eastern Irish Sea (37E6) shows lower prices.

Figure 10 Ratio of whole prawns to tails (LWE) in landings from South Rigg (blue) and the Clyde (red)



source: NI *Nephrops* buyers

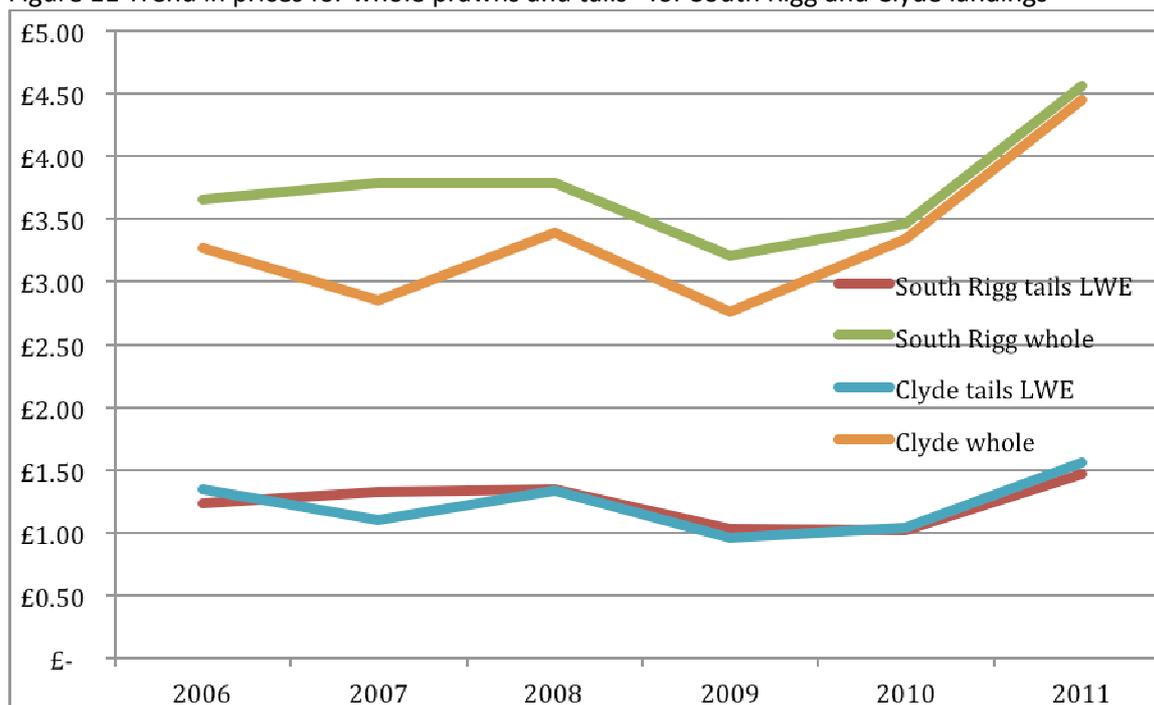
Table 4 Ratio of whole prawns to tails in South Rigg area and Clyde

Whole prawns to tails ratio			
	South Rigg	Clyde	difference in ratios
2006	1.03	0.68	35%
2007	0.97	0.42	54%
2008	0.80	0.43	37%
2009	0.99	0.51	47%
2010	1.19	0.59	60%
2011	1.0	0.53	47%

source: NI *Nephrops* buyers

² Defined as the assumed weight of the animal if landed live and whole. For *Nephrops*, a tail is estimated to constitute a third of the whole animal weight and therefore a 3:1 conversion factor is used.

Figure 11 Trend in prices for whole prawns and tails* for South Rigg and Clyde landings



source: NI *Nephrops* buyers *Live Weight Equivalent (LWE)

Table 5 Average whole prawn and tail (LWE) prices for South Rigg & Clyde *Nephrops* landings

	Average prices					
	Portavogie (South Rigg)			Campbeltown (Clyde)		
	tails	tails LWE	whole	tails	tails LWE	whole
2006	£3.71	£1.24	£3.65	£4.06	£1.35	£3.28
2007	£3.98	£1.33	£3.79	£3.32	£1.11	£2.86
2008	£4.04	£1.35	£3.79	£4.01	£1.34	£3.39
2009	£3.10	£1.03	£3.21	£2.89	£0.96	£2.76
2010	£3.06	£1.02	£3.47	£3.15	£1.05	£3.35
2011	£4.40	£1.47	£4.56	£4.69	£1.56	£4.46

source: NI *Nephrops* buyers *Live Weight Equivalent (LWE)

Price is another important variable that influences fleet behaviour. As Figure 11 and Table 5 illustrate, prawn prices rose dramatically in 2011. Last year (2011) saw an average 45% increase in prices for tails and 32% increase for whole prawn prices on 2010 prices. This is thought in part to be due to a decrease in North Sea landings of *Nephrops* resulting from real time closures that have reduced the market supply of *Nephrops* (NIFPO, 2011). This illustrates that management measures and other developments outside of the Irish Sea have significant impact on the Irish Sea fishery.

4.4 VALUE OF LANDINGS FROM MCZS

Taking effort and landed value into account leads to the estimate of first-hand sales value for the Northern Ireland fleet presented in Table 6. Appendix B presents the estimated value on a monthly basis.

Between 2007 and 2010 the average annual value of Northern Ireland fleet landings of *Nephrops* and other species from MCZs 6, 7, 1 and 2 amounts to £1.2million. This represents 10.5% of total

NI landings from across the east, west and central Irish Sea areas. For the Northern Irish trawl fleet the value from MCZ areas represents 15% of total landings.

The single most valuable rMCZ for the NI *Nephrops* fleet is South Rigg (MCZ6), accounting for 55% of total value of *Nephrops* from rMCZ areas.

4.5 DISPLACEMENT

The proposed closure of the MCZ areas to benthic fisheries, shown to account for a significant proportion of landed value to the Northern Ireland trawl fleet, is expected to displace fishing effort to other grounds.

Skippers operating in the eastern Irish Sea have indicated that the additional constraints proposed for the MCZ areas would mean that fishing on these grounds would not be viable. This effort would therefore be displaced to western Irish Sea areas or the Clyde.

It would be difficult and more costly to replace the lost earnings from the deep-water areas of South Rigg and Slieve Na Griddle. As highlighted above, these areas have a comparatively higher catch value per unit of effort. As vessels are constrained by limits on days at sea and smaller vessels are additionally constrained by fishing range, it cannot be expected that the total amount of revenues lost due to MCZs could be fully replaced by fishing elsewhere. The extent to which revenues could be generated from elsewhere in the short term and in the longer term is difficult to estimate.

The expected displaced activity from these areas will result in additional pressure on the grounds that do remain open. The VMS analysis illustrates that the NI fleet is already targeting these areas with the bulk of fishing intensity seen in these near-shore grounds. Fishermen have indicated that the seasonal fishing patterns are dictated by the need to disperse effort across grounds throughout the year. Forcing vessels off the deep-water grounds will result in vessels increasing their fishing effort on inshore grounds, which may result in decreases to the stock size and future TACs and to the catch rate and associated profitability of those grounds.

Table 6 Value of NI fleet landings from ICES areas and MCZs, 2007-2010

2007				
		total landings value ICES rectangles	MCZ as % of rectangle	value within MCZ
South Rigg	6	£10,025,445	6%	£625,493
Slieve Na Griddle	7	£7,975,105	4%	£358,850
Mud Hole	1	£1,624,169	15%	£246,452
West of Walney	2a	£1,624,169	8%	£125,897
Co-location zone	2b	£1,624,169	3%	£46,213
Total		£11,649,614		£1,402,906

2008				
		total landings value ICES rectangles	% of MCZ fishing within rectangle	value within MCZ
South Rigg	6	£11,359,146	5%	£575,860
Slieve Na Griddle	7	£8,920,056	3%	£237,531
Mud Hole	1	£1,042,143	14%	£150,042
West of Walney	2a	£1,042,143	9%	£94,621
Co-location zone	2b	£1,042,143	5%	£50,611
Total		£12,401,289		£1,108,665

2009				
		total landings value ICES rectangles	% of MCZ fishing within rectangle	value within MCZ
South Rigg	6	£9,585,736	7%	£695,076
Slieve Na Griddle	7	£7,313,517	3%	£248,135
Mud Hole	1	£817,453	16%	£129,730
West of Walney	2a	£817,453	9%	£72,948
Co-location zone	2b	£817,453	5%	£39,490
Total		£10,403,189		£1,185,380

2010				
		total landings value ICES rectangles	% of MCZ fishing within rectangle	value within MCZ
South Rigg	6	£9,896,870	7%	£654,710
Slieve Na Griddle	7	£7,412,519	3%	£191,001
Mud Hole	1	£580,851	16%	£90,546
West of Walney	2a	£580,851	5%	£30,101
Co-location zone	2b	£580,851	5%	£27,982
Total		£10,477,721		£994,339

Average 2007-2010				
		total landings value ICES rectangles	% of MCZ fishing within rectangle	value within MCZ
South Rigg	6	£10,216,799	6%	£646,006
Slieve Na Griddle	7	£7,905,299	3%	£255,790
Mud Hole	1	£1,016,154	15%	£154,451
West of Walney	2a	£1,016,154	8%	£79,393
Co-location zone	2b	£1,016,154	4%	£41,579
Total		£11,232,953		£1,177,218

source: AFBI/DARD/Poseidon

5 IMPACT ON FLEET PERFORMANCE

Table 7 presents the estimated average profitability of the key NI fleet segments, single and twin rig *Nephrops* trawl, derived from Seafish cost and earnings data. Twin rig and single rig are distinguished in the Seafish cost and earnings data, but not in the DARD data as this is not required for annual reporting purposes and some vessels may switch between the two. Recent research on fleet futures estimated that there were 44 twin rig vessels and 82 single rig vessels in the NI *Nephrops* fleet (Tingley, 2009).

The smaller vessels (40 single rig vessels between 10 and 15m) are restricted to western Irish Sea grounds (MCZ areas 6 & 7) while larger vessels (44 twin rig vessels and 42 single rig vessels over 15m) may also operate in the eastern Irish Sea areas (MCZs 1 and 2). As fishing patterns vary year on year, numbers in each is not known and therefore the total value of landings from these areas is simply divided by the total number of vessels.

Turnover varies substantially between single and twin-rig segments and therefore the proportion of total landings value per vessel derived from the MCZ areas will differ. However, as the smaller vessels are more restricted to the western Irish Sea and the most valuable MCZ areas (6 & 7), to an extent this rebalances any difference in landed value and using the average per vessel for the whole fleet is appropriate.

The average operating profits of single rig and twin rig *Nephrops* vessels are highly variable year on year. In 2006 on average single rig vessels made a loss, while both single and twin rig segments showed average operating profits of 25% in 2008. Taking aspects such as depreciation and interest into account to give net profit levels can have a significant impact on overall profitability. For example average twin rig operating profits were 25% in 2008, while average net profit was 16%.

Across the four years where data are available, for single rig vessels operating profit averages 12% and net profit is 8%. For twin rig vessels available data for 2008 and 2009 show an average operating profit of 21% and net profit of 10%. The price increases seen in 2011 suggest fleet profitability would have shown a significant increase last year.

On an individual vessel basis the value of landings from the MCZ areas is an average of £9,500 per vessel. For single rig vessels this amount represents 63% of average operating profits and 91% of net profits. In some years the value from the MCZ areas is found to exceed average profit levels. For the single rig fleet, amounting to around 80 vessels the loss of such revenue would make operations unsustainable as some years would be loss-making and net profits would be insufficient to enable long-term re-investment in the fleet.

For the twin-rig segment, the impact of losing revenue from MCZ areas would also be substantial. The value of catch with MCZ areas per vessel represents 20% of average operating profits and 40% of net profits. Again a reduction of these amounts would affect the financial viability of the fleet in the long term.

As highlighted in section 4.5, the consequences of displacement and the ability of the fleet to replace these lost earnings are difficult to quantify. These MCZ grounds are well known by skippers that fish them and moving to lesser-known grounds impacts on profit. Costs, particularly fuel costs would increase if vessels were forced to fish further afield, such as the Clyde grounds³.

³ This year (2012) has seen increased effort on West of Scotland grounds, using up days at sea allocations and reducing access to the Clyde grounds for the Northern Irish fleet.

The remaining *Nephrops* grounds would inevitably be fished harder (days at sea allowing), which would result in a reduced catch per unit effort (CPUE). For the smaller vessels that have a more restricted range, there are fewer alternative grounds available, and none that provide the good quality large prawns found on the South Rigg and Slieve Na Griddle grounds. This group would therefore experience the greatest impact from current proposals.

Table 7 Average Profitability of key NI vessel segments

	Profit				
	2006	2007	2008	2009	Average
Number of NI vessels in fleet segments	120	123	126	124	123
MCZ NI landings value	£1,402,906	£1,108,665	£1,185,380	£994,339	1,172,823
Average MCZ landings value per vessel	£11,691	£9,014	£9,408	£8,019	9,516
Area VIIa <i>Nephrops</i> single rig trawl >10m*					
Turnover	117,800	139,400	137,087	89,226	120,878
MCZ value as % of turnover	10%	6%	7%	9%	8%
Operating profit (%)	-5.30%	8%	25%	22%	12.4%
Operating profit (£)	-£6,243	£11,500	£34,400	£20,703	15,090
MCZ value as % of op. profit		78%	27%	39%	63%
Net profit (%)	-7%	4.6%	24%	11%	8%
Net profit (£)	-£7,775	£6,412	£32,356	£10,827	10,455
MCZ value as % of net profit		141%	29%	74%	91%
Area VIIa <i>Nephrops</i> twin rig trawl >10m*					
Turnover	247,400	251,000	259,000	183,512	235,228
MCZ value as % of turnover	5%	4%	4%	4%	4%
Operating profit (%)	n/a	n/a	25%	17%	21%
Operating profit (£)			63,979	31,605	47,792
MCZ value as % of op. profit			15%	25%	20%
Net profit (%)			16%	3%	10%
Net profit (£)			42,317	5,527	23,922
MCZ value as % of net profit			22%	145%	40%

*for 2009 data segments were redefined as <250kW and >250kW; these are assumed reflect the single rig and twin rig categories respectively.

Source: Seafish cost & earnings data

6 SOCIO-ECONOMIC IMPACTS

6.1 JOBS IN FISHING

The average employment per vessel in the NI trawl fleet has remained relatively stable between 2006 and 2009 at 4 full time equivalents (FTE) for single rig and 5 FTE for twin rig (Seafish, 2011). This amounts to average of 535 full time jobs. Marine Management Organisation (MMO) figures for 2009 give 541 full time NI fishermen and 654 in total (full and part-time). The NI trawl fleet clearly represents the vast majority of jobs in the NI catching sector.

6.2 CO-DEPENDENCE OF FLEET AND SCAMPI PROCESSORS

Table 8 below shows the amount of NI prawns landed by the fleet and purchased by local processors. Around 80% of landings (by Live Weight Equivalent) are tailed (row **a**) with 20% landed as whole prawns.

Local prawn processors purchase nearly all (95-99%) of the tails landed by the fleet (see row **c**). Close to ¾ of whole prawns landed by the fleet are also purchased by these processors (row **d**). These data show local marketing chains are highly dependent on the presence of local processors as buyers; there is a co-dependence between the NI fleet and NI processors. This is supported by findings from the Seafish processor survey, which found 82% of supplies were sourced from auction (Seafish, 2008), the highest dependency on local landings of all the UK regions.

Local landings do not fully support the raw material demands of Northern Ireland's scampi processors. Around 60% of tails comes from the local fleet (row **b**), with additional supplies from Ireland and elsewhere in the UK. Prawn processing capacity has built up in Kilkeel and other NI ports to tap into the direct supplies from the local fleet.

With less supply available from the local fleet, processors would have to source a greater proportion from elsewhere. The strategic benefit of being located at the Northern Ireland ports would be diminished. As the main market is on the UK mainland, companies would weigh up the pros and cons of continued operation in Northern Ireland. If more landings were to the UK mainland, relocation or (for larger companies) consolidation to mainland premises would be more likely.

Table 8 Consumption of whole prawn & tails by NI processors

		2009		2010	
a	Tails-live weight of animals (from landing records) in T	5,888	81%	5,553	78%
	Whole prawns (from landing records) in T	1,409	19%	1,570	22%
	total	7,297		7,123	
	Total tails used (from scampi processors) in T	3,029		3,244	
b	Tails sourced in NI in T	1,863	62%	1,829	56%
c	Tails live weight of animals (ie x3) in T	5,589	95%	5,487	99%
d	Whole prawns used by NI industry	1,045	74%	1,070	68%

source: DARD

The most recent Seafish processing survey estimated there were nearly 500 employed in fish processing in Northern Ireland (Seafish, 2008), the great majority are with scampi processors. The recent closure of Parkgate at Portavogie with the loss of 30 jobs and the acquisition of Rockall at Kilkeel by another Kilkeel operator, Middleton (owned by Whitby Seafoods), shows the difficult

times being faced by scampi processors with raw material supply limited and the need to make efficiencies.

If the NI processors closed, the vessels would land less of their remaining catch into Northern Ireland's ports and instead land to the remaining processors in South West Scotland and Cumbria creating a cycle of decline in Northern Ireland's fishing ports.

6.3 COMMUNITY IMPACTS

The prawn fleet is based at the three main NI fishing ports Ardglass, Kilkeel and Portavogie. The number of full time fishermen at these ports in 2009 and how this relates to local employment in the towns (ward level) is presented in Table 9. This illustrates the high level of dependency on fishing employment in these areas, which is higher still when upstream and downstream industries are taken into account, such as employment in scampi processing.

Table 9 Fishing employment as a proportion of local employment

Port	Full time fishermen	Total employment	Fishing as % of total
Ardglass	98	496	19.7%
Kilkeel	230	2,384	9.6%
Portavogie	187	474	39.5%

Source: MMO, NISRA

Gross Value Added (GVA)⁴ for the West and South of Northern Ireland average is £12,191 per head of population in 2009. This is lower than the NI average and compares to a UK average of £20,341 (ONS, 2010). This illustrates the importance of private sector jobs that contribute to GVA for these areas.

Seafish conducted an input-output analysis to show the value of UK fishing and fish processing to the UK economy (Seafish, 2006). Based on 2002 data it was estimated that if the value at first sale of fish landings decreased or increased by £1 million, the expected impacts for shellfish species are:

- UK Output would change by £7.16 million;
- UK Employment would change by 113 FTE jobs;
- UK GDP would change by £2.57 million.

As the NI processing industry retains nearly all NI landings, the impacts on the UK economy from reductions to NI landings can be expected to predominantly occur in Northern Ireland.

The estimated value of NI landings from the rMCZ areas averages £1.2 million for the years 2007-2010. Applying the price increases seen in 2011 that value would be far greater. The input-output analysis shows that the loss of this level of revenue would have a major impact on the Northern Ireland fishing industry and the sectors and communities that depend upon it.

⁴ GVA is a measure of the value of goods and services produced in the economy.

7 IRISH SEA CONSERVATION ZONES PROJECT IMPACT ASSESSMENT

The Northern Irish fishing industry has a number of concerns with the Irish Sea MCZ process, not least the imbalance in stakeholder consultation due to late recognition that Northern Ireland's fleet accounts for the vast majority of effort in the Irish Sea. This section, however, does not reiterate those concerns, but focuses on the Irish Sea MCZ Impact Assessment (specifically the outputs and various Annexes circulated to stakeholders) and its fisheries value estimates to establish whether comparison with Poseidon's analysis is appropriate.

The following section reviews the Impact Assessment submitted to the UK Minister in July 2012. A draft was circulated to stakeholders in January 2012. The extent of changes compared to the circulated draft is unknown.

7.1 APPROACH

The Impact Assessment (IA) differs to the evaluation presented in this report by approach and data used. Therefore while comparison of the two reports may be inevitable, comparing the resulting values is not appropriate. The IA is required to follow government guidelines for Impact Assessments and express impact in terms of the UK economy, whereas this report focuses the particularly significant impacts on the Northern Irish fleet and its dependent businesses and communities.

The IA states that: "The distribution of value of landings within an ICES Rectangle for a given vessel using a given gear type can be described by the aggregate distribution of fishing effort for the UK fleet using that gear type:

- Processed VMS data provides information on the number of hours fishing. It is assumed that the number of hours fishing can be used as an adequate proxy for fishing effort.
- Spatial distribution of fishing effort is then used to estimate the spatial distribution of value of landings. "

Both studies therefore use effort as a proxy for value, but it has not been possible to verify the specific effort and value data used in the IA. The source VMS effort data used is expected to be the same, but it is the filtering of that data to determine active fishing by fleet type that is critical in determining effort per area. AFBI undertook the analysis of VMS data for this study using agreed industry norms for towing speeds and filtering out areas around harbours where slower speeds would not indicate fishing and loughs where trawling does not occur.

The most critical difference in approach is this report's use of real price data and catch ratios (tails to whole). This is an important distinction made by the industry as the two most important MCZ areas to the NI fleet, MCZ6 (South Rigg) and MCZ7 (Sleive Na Griddle) are key areas for sourcing larger grade Nephrops for the more lucrative whole langoustine market. Catch ratios are 1:1 in these areas (as much whole is landed as tails) compared to other areas where twice as much tailed Nephrops is landed compared to whole (see section 4.3). By contrast the IA is thought to work on an average price for Nephrops (whole and tail prices combined). This is equitable if applied across the board, but would result in underestimates for certain areas such as MCZ6 and 7 for the reasons stated above.

An MCZ fisheries model was developed which used the following data sources:

Table 10 Data sources used in Irish Sea MCZ impact assessment

Data source	Years	Spatial Resolution	Comment
MMO iFISH data on value of landings per gear type per ICES rectangle	2007-2010	Per ICES rectangle	Unclear how value of landings is calculated (landings per ICES rectangle x average price?)
VMS data Spatial distribution for >15m vessels	2007-2009	Aggregated to 3km x 5.5km squares	2010 too late for inclusion
Fishermap Spatial distribution for <15m vessels	2007-2010	unknown	Unknown: the number of fishermap interviews undertaken, method of aggregation.

Source: Adapted from Irish Sea MCZ Project, 2011

For the under 15m fleet where no VMS data is available, the IA has used Fishermap interviews while this report makes the assumption (based on industry consultation) that for the western Irish Sea areas, effort by the under 15m fleet is spatially distributed as per the over 15m fleet. Details of the Fishermap interview results are not available. Therefore it is not possible to corroborate these results. It is also not clear the extent to which Fishermap results are corroborated using a data-led approach. This combination of survey and data-led approaches can cause problems with adequate corroboration and ground-truthing.

Impact Assessments should include a range of options to enable comparative impacts to be assessed. In the case of the Irish Sea MCZ project the 'options' are limited to three scenarios with differing management measures associated with each. It is disappointing that the IA did not include any consideration of alternative sites. The IA states that "Because the aim of the MCZ Project was to develop a set of site recommendations through stakeholder negotiations it is not appropriate for the IA to propose more than one option unless more than one option was recommended by the MCZ Regional Stakeholder Group." This shows that the sites were recommended before an IA was conducted, which would have informed stakeholder negotiations of social and economic impacts and may have led to alternatives being sought.

The management measures proposed are specific to each MCZ, but effectively consider the inclusion or exclusion of bottom gear. For example the MCZ6 South Rigg management scenarios considered are:

Scenario 1: Entire pMCZ is open to all gear types.

Scenario 2: Closure of entire pMCZ to bottom trawls and dredges.

Scenario 3: Closure of entire pMCZ to bottom trawls, dredges, hooks and lines.

The results for scenario 2 and 3 in terms of estimated annual values affected are exactly the same: £1.015 million as no fishing with hooks and lines is identified. So in practice the IA only considers closure to current fishing activity against the current situation. This does not align with Defra's policy on MCZ management (JNCC, 2010):

1 Both regulatory and non-regulatory mechanisms should be investigated (e.g. the consideration of both voluntary agreements and bylaws).

2 Management measures with the least social and economic impact should be implemented where effective in meeting conservation objectives (this could mean changes in gear type or seasonal closures rather than area closures).

3 Management Measures should be proportionate to the conservation objectives of the feature (for example this could mean introducing a permit scheme and monitoring program rather than a complete prohibition).

The above suggests a whole suite of management measures should be considered rather than exclusion. This includes gear developments, something that is already being implemented by the Northern Irish industry.

7.2 FISHERIES VALUE ESTIMATES

The values of landings presented in the IA are not comparable to the values in this report, which focuses only on the Northern Irish fleet. This fact, along with other methodological differences, makes a direct comparison inappropriate (even if inevitable). However, both studies do identify the MCZs of particular significance to the fleets are MCZs 1,2, 6 and 7.

MCZs 6 (South Rigg) and 7 (Sleive Na Griddle) are the most important to the Northern Irish trawler fleet, which now almost exclusively targets *Nephrops* (rather than whitefish). This is evidenced throughout this report and is supported by Figure 12 showing the greatest shellfish values from the Western and Central Irish Sea (37E4 and 37E5).

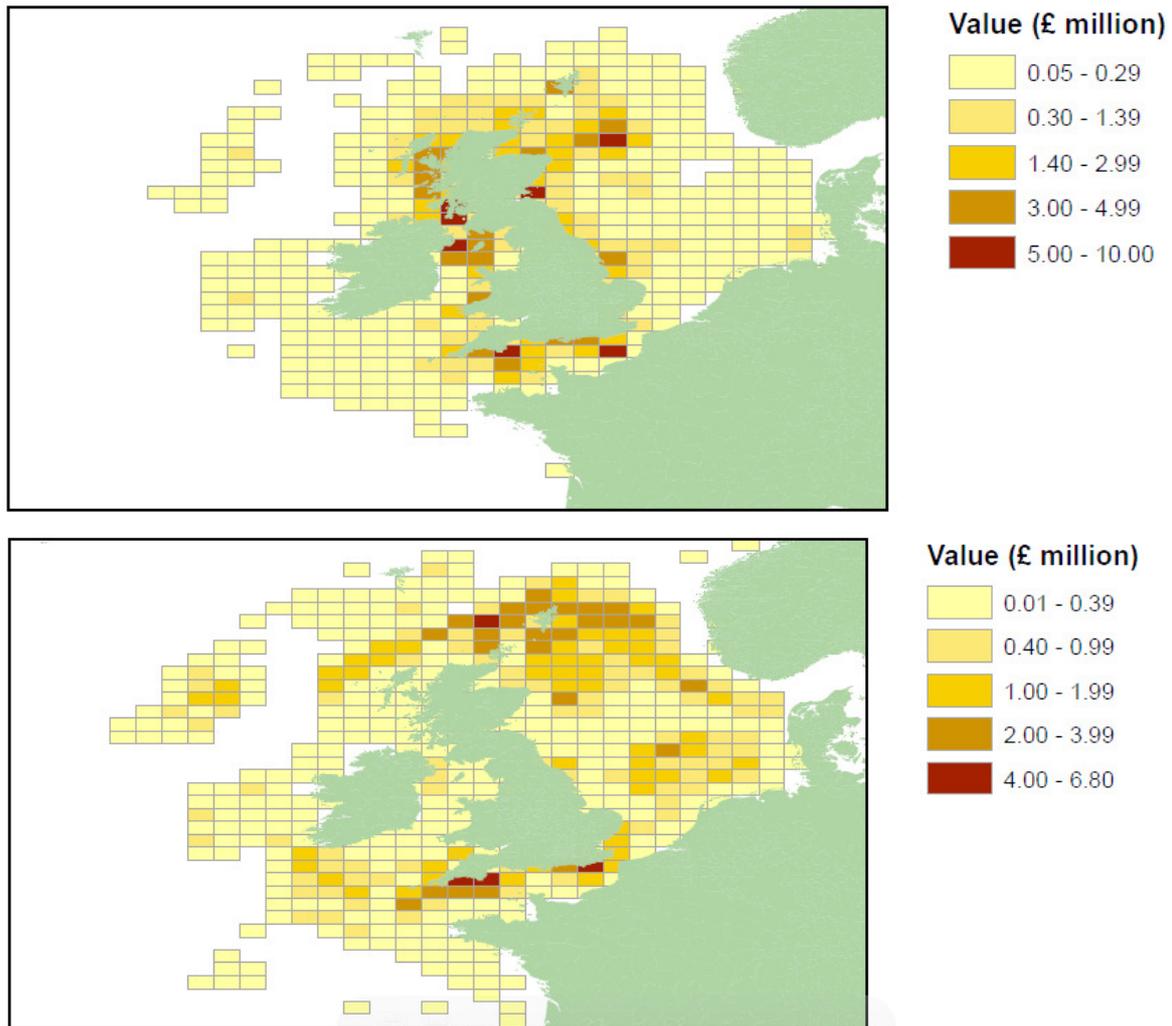
The IA estimates landed value for MCZ1 (Mud Hole) and its reference area at £1.396million/yr, of which 92% is from bottom trawlers that may be excluded under certain management scenarios. As Annex J of the IA notes, this is particularly important to the Cumbrian fleet targeting *Nephrops* (and therefore not reflected in this report). The finding that the MCZ1 (Mud Hole) is the most valuable of all the Irish Sea MCZs is not, however supported by MMO landing statistics per ICES rectangle (see Figure 12).

It is not clear how landings of over £1.4 million/yr can be derived from Mud Hole, a 72.65km² area, while total landings from the ICES rectangle in the Eastern Irish Sea (37E5) do not amount to much more than this. The effort maps presented in this report show that effort (by the NI fleet only) in that area extends east inshore from MCZ1 as well as down through MCZ2 to the southeast. As the Cumbrian and NI fleets are also targeting *Nephrops* on these distinct grounds, the distribution of effort should be reasonably similar. The data on which these findings were based have not been available for review, but this does put the whole valuation and in turn the IA into question.

The volatility in *Nephrops* prices (see section 4.3) illustrates the risk in taking a limited snapshot of fishing activity and determining impact based on an estimate of an area's absolute value.

With the implementation of management measures preventing trawling in MCZs, vessels would be concentrated into fewer existing fishing grounds in the Irish Sea and elsewhere in UK waters. There are genuine concerns from the Northern Irish fleet that:

- The area of fishing grounds lost is greater than the area within the rMCZ boundaries. This is because some of the fishing grounds adjacent to rMCZs 1, 6 and 7 will become impractical to trawl.
- The existing grounds that remain open would be fished harder, which may be unsustainable as presently the grounds are fished only in some months of the year.
- For larger vessels that may choose to target *Nephrops* grounds further afield there would be an increase in operational costs and reduced revenue, decreasing the viability of a number of vessels and potentially reducing supply to NI processors.

Figure 12 Value of shellfish (top) and demersal (bottom) landings by UK vessels in 2010

source: MMO, 2011

These issues are reported within Annex J on 'Qualitative Assessment of Impacts' (one of the numerous Annexes circulated to stakeholders), but there has been no attempt to quantify any of these knock-on or cumulative impacts in the IA.

7.3 SUMMARY

This report only focuses on the Northern Irish fleet and associated social and economic impacts, while the IA is in the context of 20 year, UK-wide economic impacts. Data sources differ and there are also a number of methodological differences that make the two reports incomparable.

The timing of the IA means it was not available for stakeholder negotiations to adequately consider (and therefore minimise) social and economic impacts in developing the recommended MCZs.

The IA is based on options that only consider very limited fishing/no fishing management measures; these are not in line with Defra's policy encouraging a variety of effective measures with the least social and economic impact.

The IA produced values that are not supported by the reported landed value per ICES rectangle, at least for some MCZ areas. Without access to the data used, the basis for these values is unknown and puts the overall valuation and findings of the IA into question.

Both the IA and this report highlight the MCZs that are most important to the fishing industry. The IA touches on socio-economic impacts by reporting industry comments relating to knock-on effects for processors. This report explores these in more detail, showing the co-dependence of Northern Ireland's Nephrops fleet and its processors.

The large price increases for 2011 (see section 4.3) illustrate the substantial variability in revenue and the difficulties in establishing values (particularly future values) for such a dynamic economic sector. This also illustrates the limitations of assuming an area's importance on absolute value rather than proportionate value to the fleet.

8 CONCLUSIONS

8.1 FISHING INTENSITY

- The current proposals for Marine Conservation Zones include the closure of areas to benthic fishing. As the proposed areas are *Nephrops* grounds, this directly impacts the entire NI prawn fleet amounting to 121 vessels (82% of the over 10m fleet).
- The MCZs in which the NI fleet fishes are Mud Hole (MCZ1), West of Walney & proposed co-location zone (MCZ2), South Rigg (MCZ6) and Slieve Na Griddle (MCZ7). These account for significant proportions of the fishing effort recorded within the ICES rectangles containing them.
- There is a large peak in fishing intensity and total landings in the western Irish Sea (ICES rectangle 37E4) over the summer months with more fishing by the inshore and the over 10m fleet. A smaller spring peak is also evident in 37E4. For the eastern Irish Sea (37E6), a peak in landings is seen in April and May, while landings from the central Irish Sea (37E5) fluctuates through the year.

8.2 VALUE PER MCZ

- Between 2007 and 2010 the average value of Northern Ireland fleet landings of all species from MCZs 6, 7, 1 and 2 amounts to £1.2million. For the Northern Irish fleet this represents 10.5% of total landed value in the east, west and central Irish Sea areas. For the Northern Irish trawl fleet this represents 15% of its total landings from these areas.
- For the most recent four years where data are available, operating profits for single rig vessels averaged 12% and net profit was 8%.
- Twin rig vessels (available data for 2008 and 2009⁵) show an average operating profit of 21% and net profit of 10%.
- The single most valuable MCZ in terms of turnover (sales) for the NI fleet is South Rigg (MCZ6), accounting for 55% of total value from MCZ areas. However it was not possible to establish whether this is the most profitable in terms of profit margin (percent of sales) or profit amount in GBP.
- 2011 saw *Nephrops* tail prices rise by 45% and whole prawns 32% - these substantial increases resulted in higher overall landed values and improved fleet profitability.

8.3 FLEET PERFORMANCE

- On an individual vessel basis the value of landings from the MCZ areas is an average of £9,500 per vessel. For some recent years this average value from the MCZ areas is found to exceed the amount of average profit.
- A loss of revenue does not always result in a proportionate decrease in profitability, but the loss of higher value prawns from the deep-water areas may have a proportionally greater impact on overall profitability.

⁵ Seafish changed the segmentation criteria between 2008 and 2009 so that whereas single and twin rig were specified in 2008 figures, for 2009 it had changed to over and under 250kW, which would be mostly twin (>250) and single (<250) but not exclusively.

- The consequences of displacement and the ability of the fleet to replace these lost earnings are difficult to predict and to quantify. Costs may well increase as vessels would be forced to fish further afield, increasing fuel costs and reducing profitability.
- The remaining grounds would experience higher fishing effort than before the restrictions (days at sea allowing), which would result in a reduced catch per unit effort (CPUE) and so further reducing profitability.
- For the smaller vessels that have a more restricted range, there are fewer alternative grounds available, and none that provide the good quality large prawns found on the South Rigg and Slieve Na Griddle grounds. This group would therefore experience the greatest impact from current proposals.

8.4 SOCIO-ECONOMIC IMPACTS

- The average employment per vessel in the NI trawl fleet has remained relatively stable between 2006 and 2009 at 4 full time equivalents (FTE) for under 250kw and 5 FTE for over 250kw (Seafish, 2011). This amounts to an estimated average of 535 full time jobs.
- MMO figures for 2009 give 541 full time NI fishermen and 654 in total (full and part-time). The NI trawl fleet clearly represents the vast majority of jobs in the NI catching sector.
- The Northern Ireland fish processing sector provides around 500 full time jobs.
- Nearly all (95-99%) of the tails landed by the fleet are purchased by local prawn processors (see row c). Close to $\frac{3}{4}$ of whole prawns landed by the fleet are also purchased by these processors, meaning that local marketing chains are highly dependent on the presence of local processors as buyers.
- Processors need the larger deep-water prawns to maintain market position, attracting customers with the supply of the full range of size grades for whole prawns.
- With less supply available from the local fleet, processors would have to source a greater proportion from elsewhere. The strategic benefit of being located at the Northern Ireland ports would be diminished and companies may well relocate or consolidate at UK mainland premises.
- If the processors disappeared, NI vessels would land less of their remaining catch into Northern Ireland's ports and instead land to remaining processors in South West Scotland and Cumbria. Vessels that continued to land into NI ports, could receive lower prices as buyers would have additional transport costs to factor into prices paid.
- The prawn fleet is based at the three main NI fishing ports Ardglass, Kilkeel and Portavogie. These show a very high level of dependency on fishing employment (19.7%, 9.6% and 39.5% of total local employment respectively), which is higher still when upstream and downstream industries are taken into account, such as employment in scampi processing.
- As the NI processing industry retains nearly all NI fleet landings, the impacts on the UK economy from reductions to NI landings can be expected to predominantly occur in Northern Ireland
- Input-output analysis has estimated that if the value at first sale of fish landings decreased by £1 million, the expected impacts for shellfish species are: output reduced by £7.16 million; UK employment would change by 113 FTE jobs; and GDP would change by £2.57 million.

- The loss of revenue estimated from MCZ areas would have a major impact on the Northern Ireland fishing industry and the sectors and communities that depend upon it.

8.5 IRISH SEA MCZ IMPACT ASSESSMENT

- The Irish Sea MCZ IA is on a UK-wide basis, while this report focuses on the Northern Irish fleet and associated socio-economic links. Due to this difference in scope and various methodological differences direct comparison of values is not appropriate.
- The timing of the IA has meant that it was not available for stakeholder negotiations to adequately consider (and therefore minimise) social and economic impacts in developing the recommended MCZs.
- The IA is based on very limited fishing/no fishing management measures; these are not in line with Defra's policy that encourages a variety of effective measures with the least social and economic impact.
- The IA has produced values that are not supported by the reported landed value per ICES rectangle, at least for some MCZ areas. Without access to the data used, the basis for these values is unknown and puts the overall valuation and findings of the IA into question.

8.6 FURTHER WORK

- Due to the substantial impacts of the rMCZs on the Northern Irish fleet and for Northern Ireland highlighted in this report, it is proposed that further exploration of the extent of management measures, alternative sites and amendments to boundaries is needed to minimise the socio-economic impact resulting from MCZ designation.
- With the potential impacts of renewable energy development proposals and additional Marine Protected Areas under the NI Marine Bill in NI inshore waters, there is an urgent need for a more joined-up approach to Irish Sea management.

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DARD (2011) Volume and value of Northern Ireland fleet landings 2006-2010

Irish Sea MCZ Project (2011) Identification of Fisheries Value Estimates for each pMCZ

JNCC (2010) Establishing fisheries management measures to protection Marine Conservation Zones, November 2010. JNCC, Defra, Natural England

NISRA (2009) Labour market report: Employment Ward level. Northern Ireland Statistics and Research Agency.

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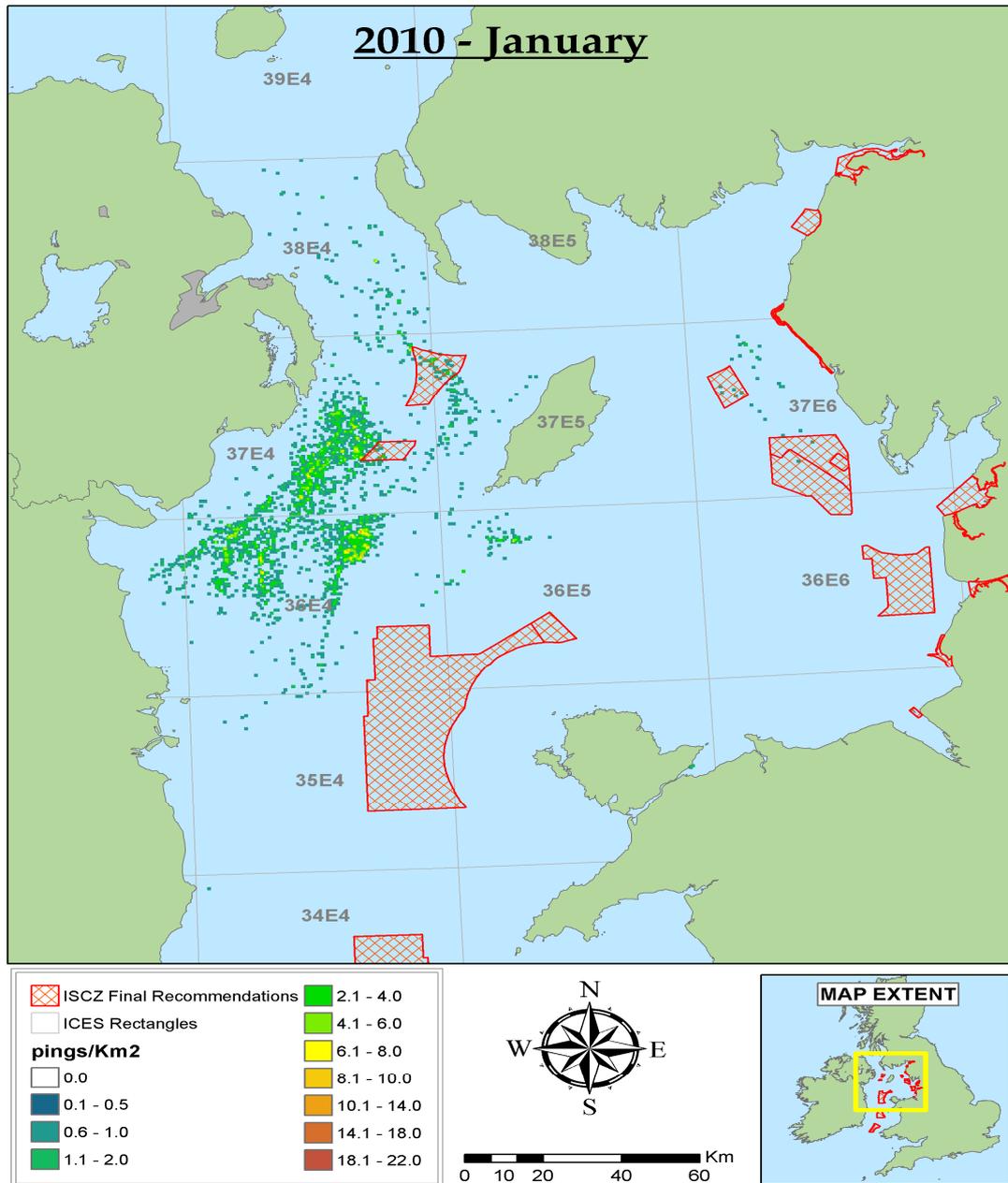
Seafish (2006) The Economic impacts of the UK Sea fishing and fish processing sectors: An input-output analysis

Seafish (2008) Survey of the UK seafood processing industry, Adam Brown, Seafish.

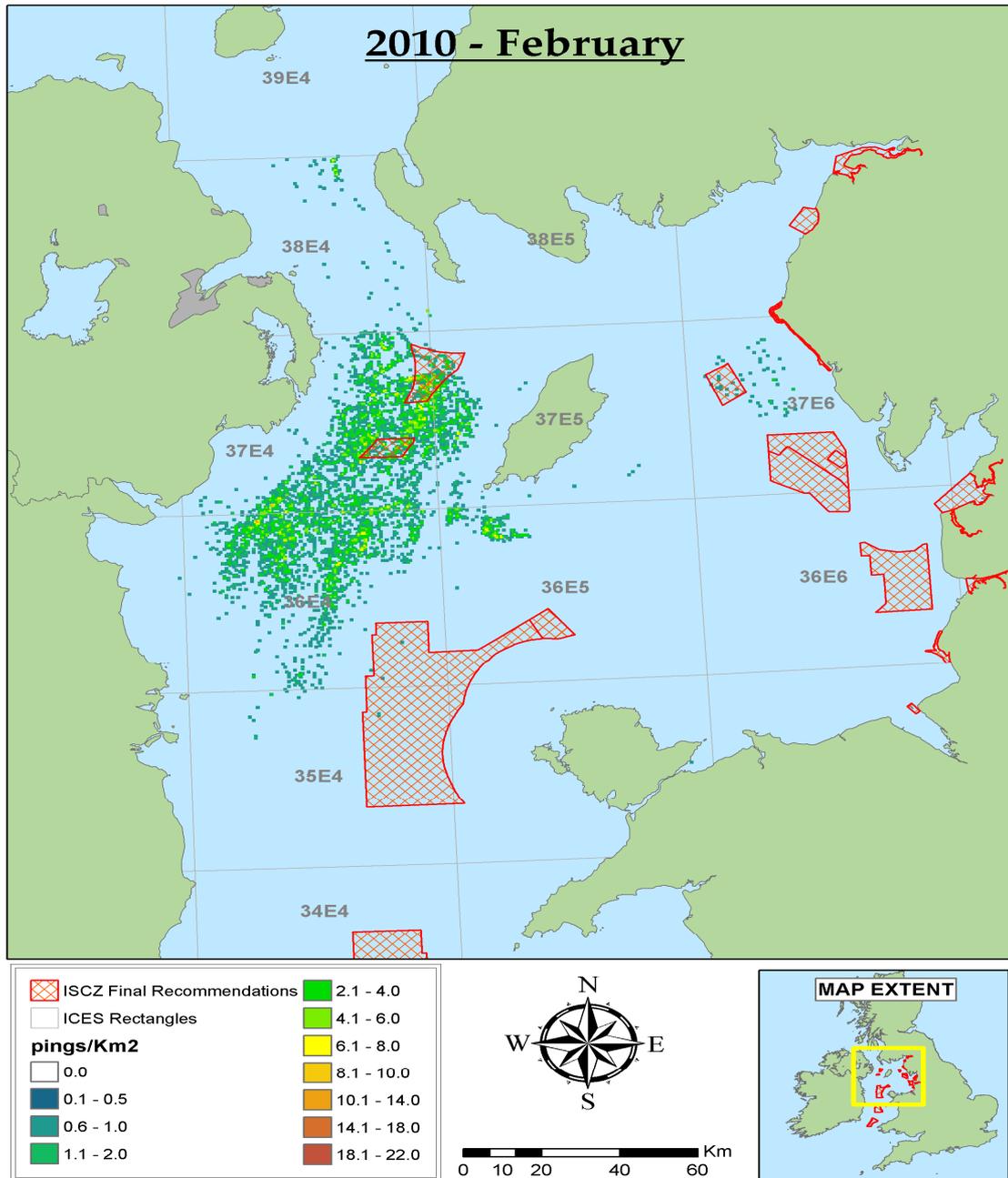
Seafish (2007-2011) Annual Economic survey of the UK fishing fleet

Tingley, D (2009) Northern Ireland Fleet Futures Analysis (2008-2013 update) June 2009

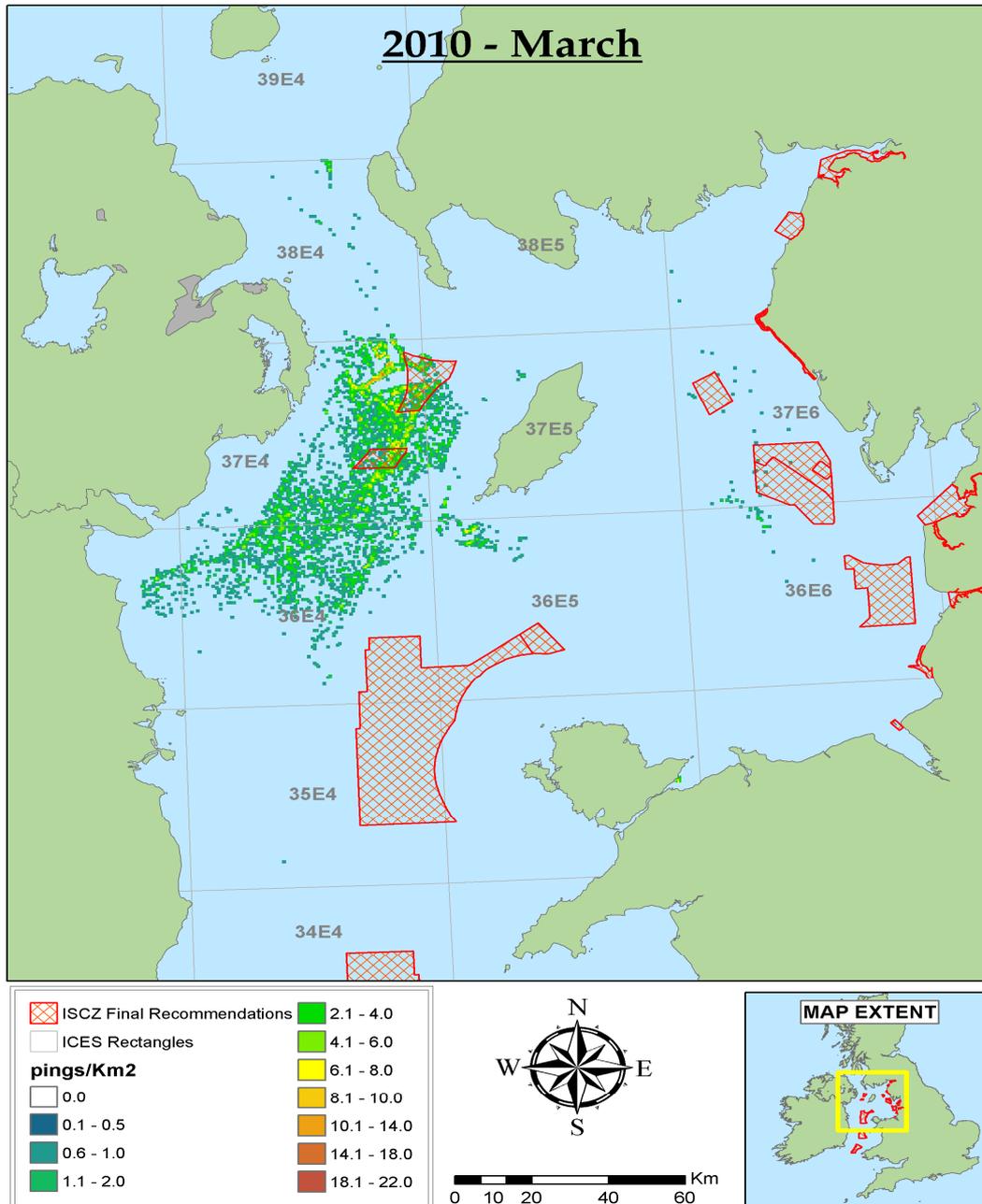
APPENDIX A: NI FLEET FISHING INTENSITIES PER MONTH IN 2010



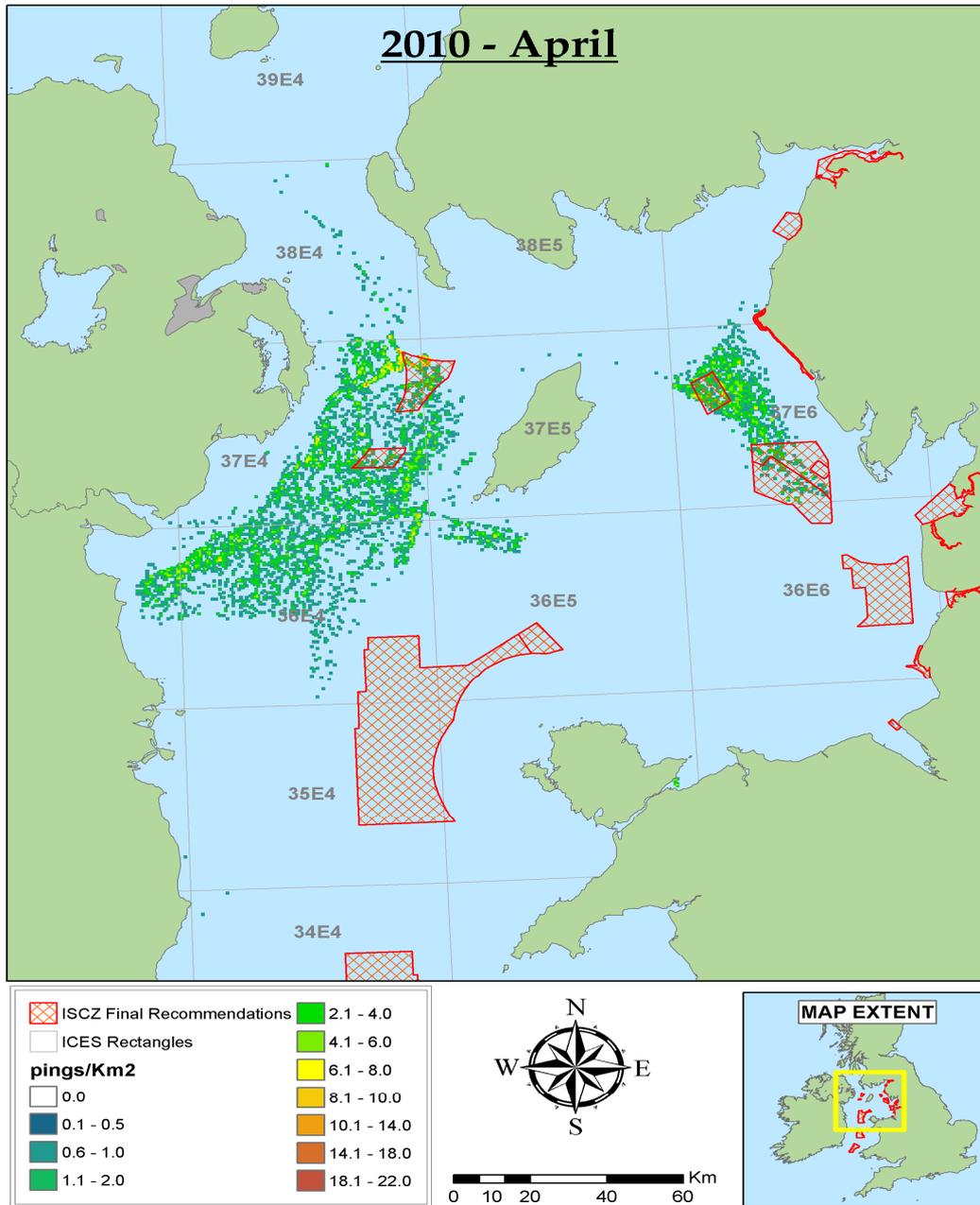
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
West of Walney	4	33E3	4
South Rigg	155	34E4	4
Slieve Na Griddle	70	35E4	34
Mud Hole	20	35E5	12
(blank)	10247	36E3	174
Proposed co-location zone	4	36E4	4891
Grand Total	10500	36E5	256
		37E4	4211
		37E5	446
		37E6	116
		38E4	352
		Grand Total	10500



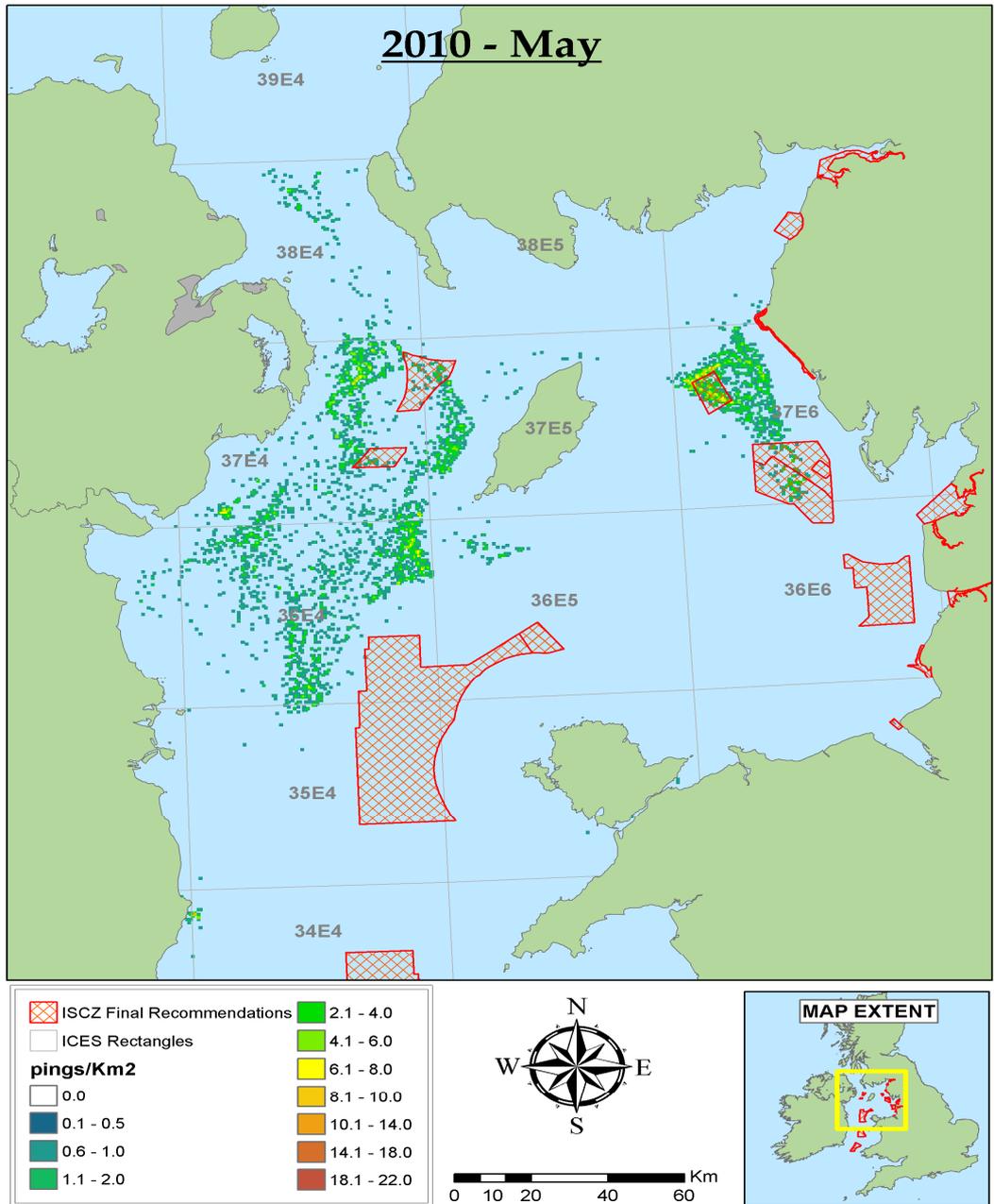
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Mud Hole	47	33E4	4
North St George's Channel	16	35E4	50
Slieve Na Griddle	382	35E5	4
South Rigg	888	36E3	4
(blank)	17289	36E4	6679
Grand Total	18622	36E5	744
		37E4	8859
		37E5	1726
		37E6	224
		38E4	308
		38E5	18
		39E4	2
		Grand Total	18622



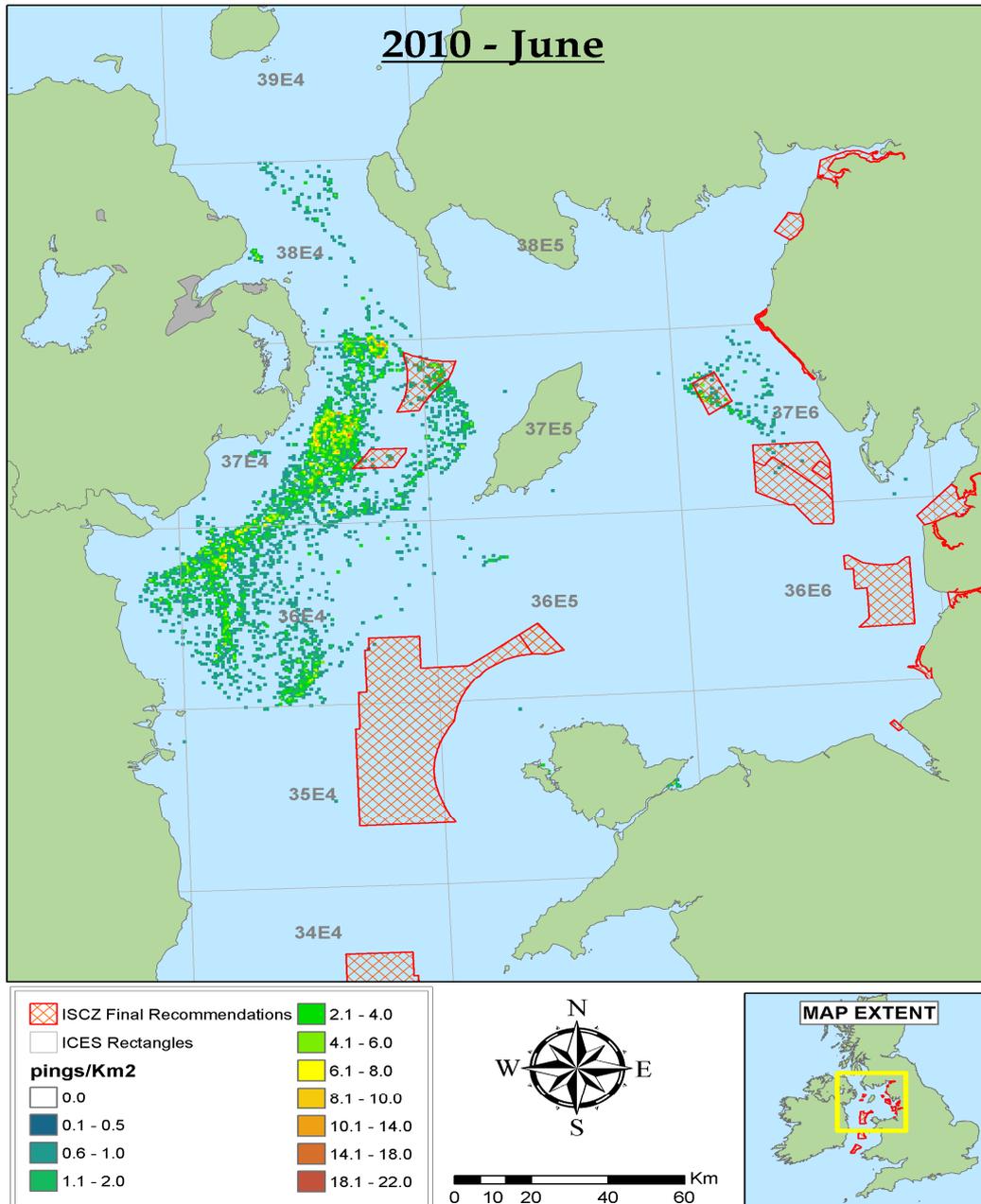
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Proposed co-location zone	15	35E4	4
Slieve Na Griddle	495	35E5	44
South Rigg	899	36E3	356
West of Walney	8	36E4	5017
(blank)	17173	36E5	504
Grand Total	18590	36E6	94
		37E4	10821
		37E5	1300
		37E6	146
		38E4	290
		38E6	8
		39E4	6
		Grand Total	18590



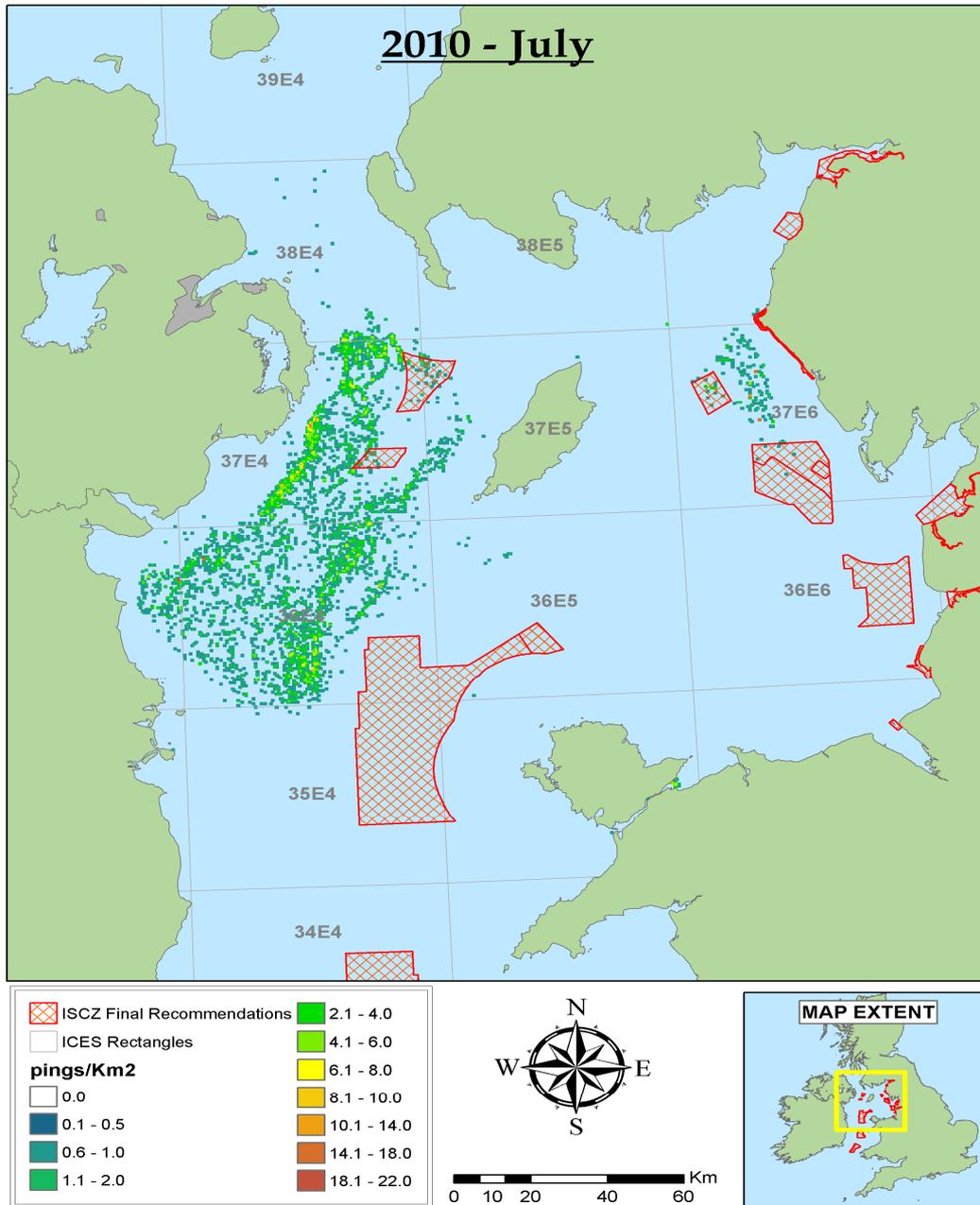
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Cumbrian Coast	6	34E4	8
Mud Hole	645	35E3	8
Proposed co-location zone	322	35E5	56
Slieve Na Griddle	213	36E3	859
South Rigg	887	36E4	5944
West of Walney	344	36E5	710
(blank)	20475	36E6	4
Grand Total	22892	37E3	4
		37E4	8830
		37E5	1365
		37E6	4705
		38E4	352
		38E6	47
		Grand Total	22892



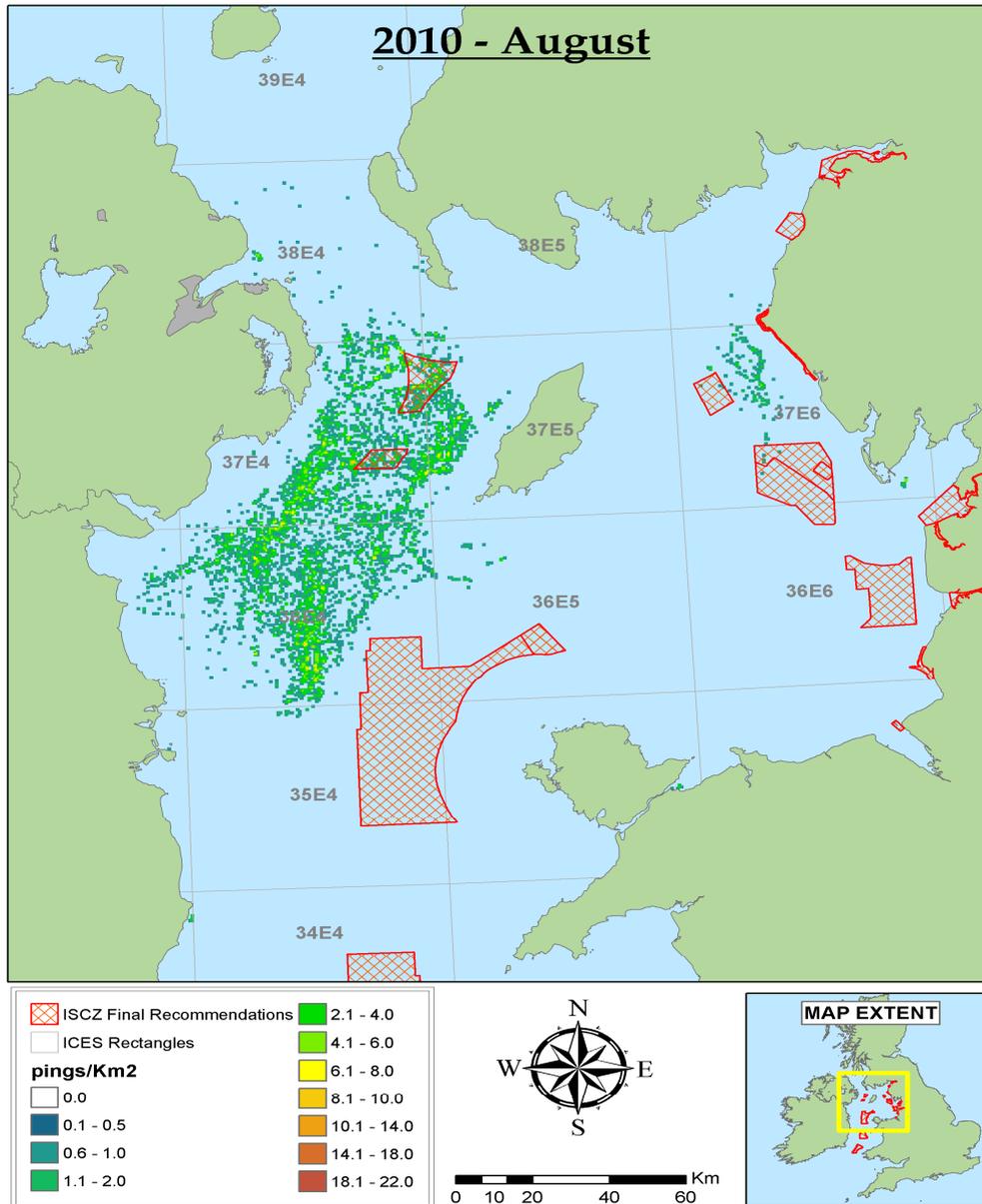
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Cumbrian Coast	8	34E3	32
Mud Hole	801	34E4	108
North St George's Channel	2	35E4	82
Proposed co-location zone	254	35E5	16
Slieve Na Griddle	81	36E3	99
South Rigg	207	36E4	4957
West of Walney	147	36E5	212
(blank)	13818	37E3	3
Grand Total	15318	37E4	3904
		37E5	1281
		37E6	4094
		38E4	492
		38E6	38
		Grand Total	15318



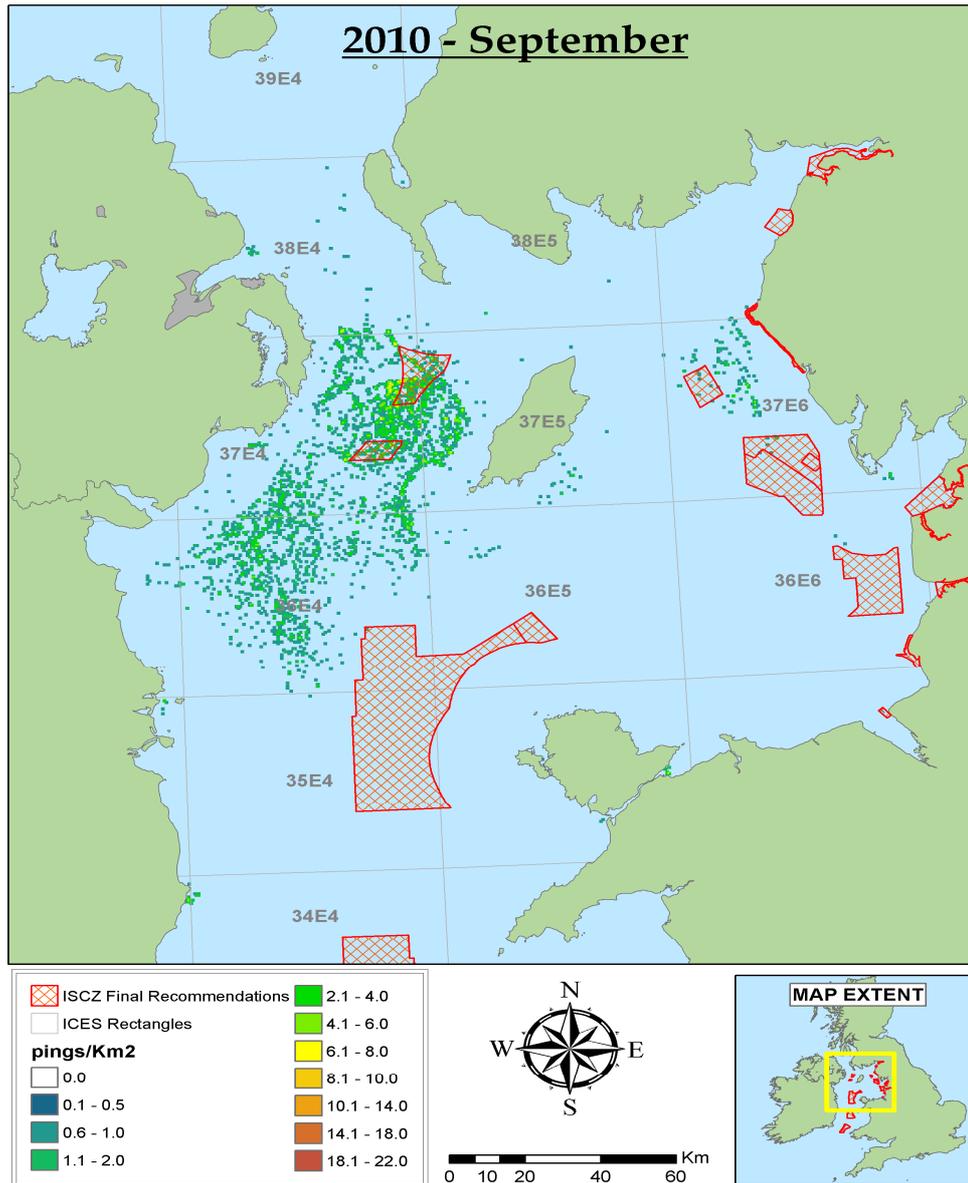
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Mud Hole	245	33E2	28
North St George's Channel	6	33E3	16
Proposed co-location zone	11	35E3	4
Slieve Na Griddle	42	35E4	16
South Rigg	342	35E5	88
West of Walney	25	36E3	554
(blank)	18185	36E4	6587
Grand Total	18856	36E5	88
		37E4	8785
		37E5	1060
		37E6	796
		38E4	828
		39E4	6
		Grand Total	18856



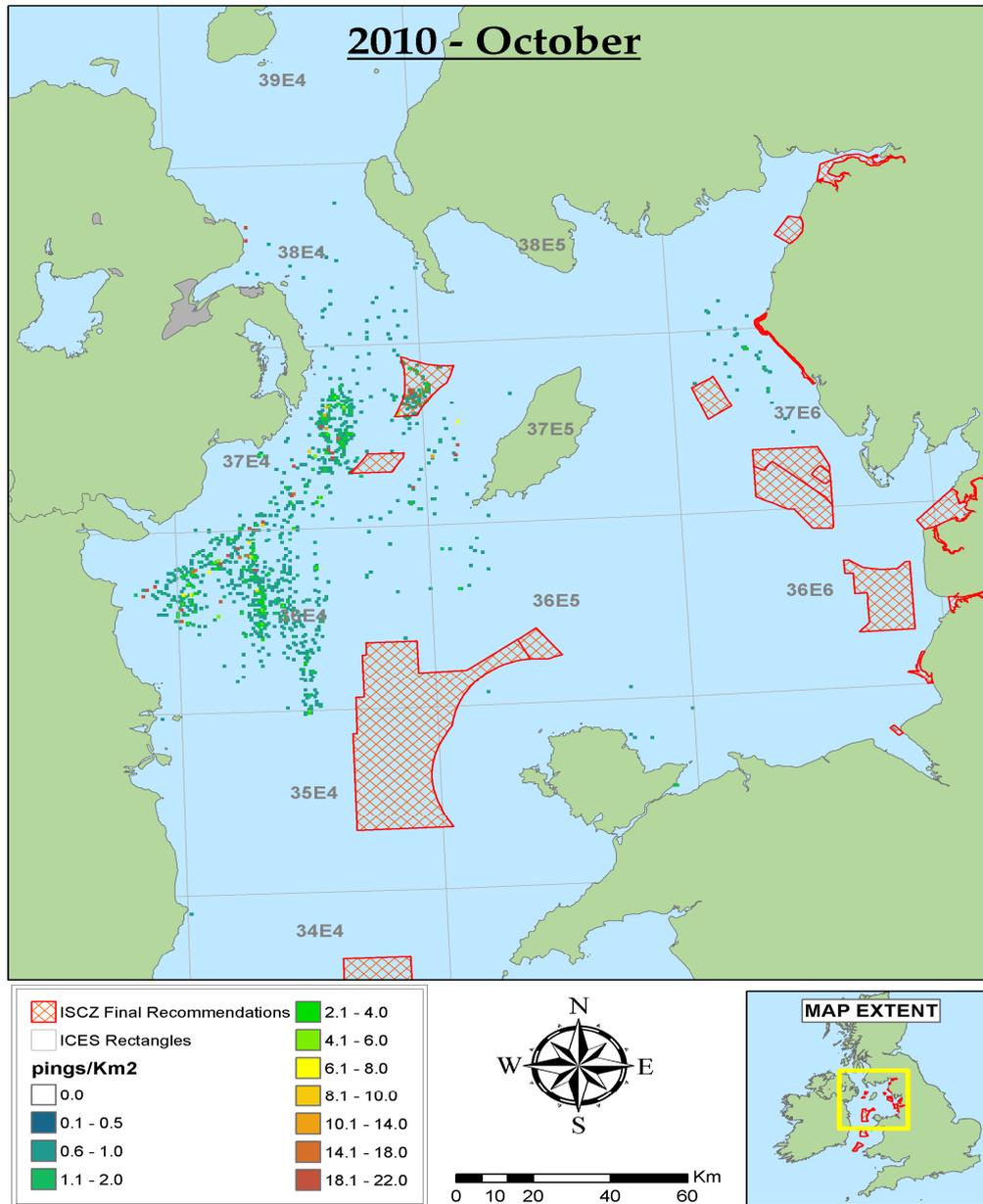
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Cumbrian Coast	5	35E3	4
Mud Hole	72	35E4	24
Proposed co-location zone	4	35E5	92
Slieve Na Griddle	64	36E3	708
South Rigg	158	36E4	7695
West of Walney	20	36E5	40
(blank)	16185	37E3	4
Grand Total	16508	37E4	6287
		37E5	391
		37E6	832
		38E4	403
		38E5	12
		38E6	16
		Grand Total	16508



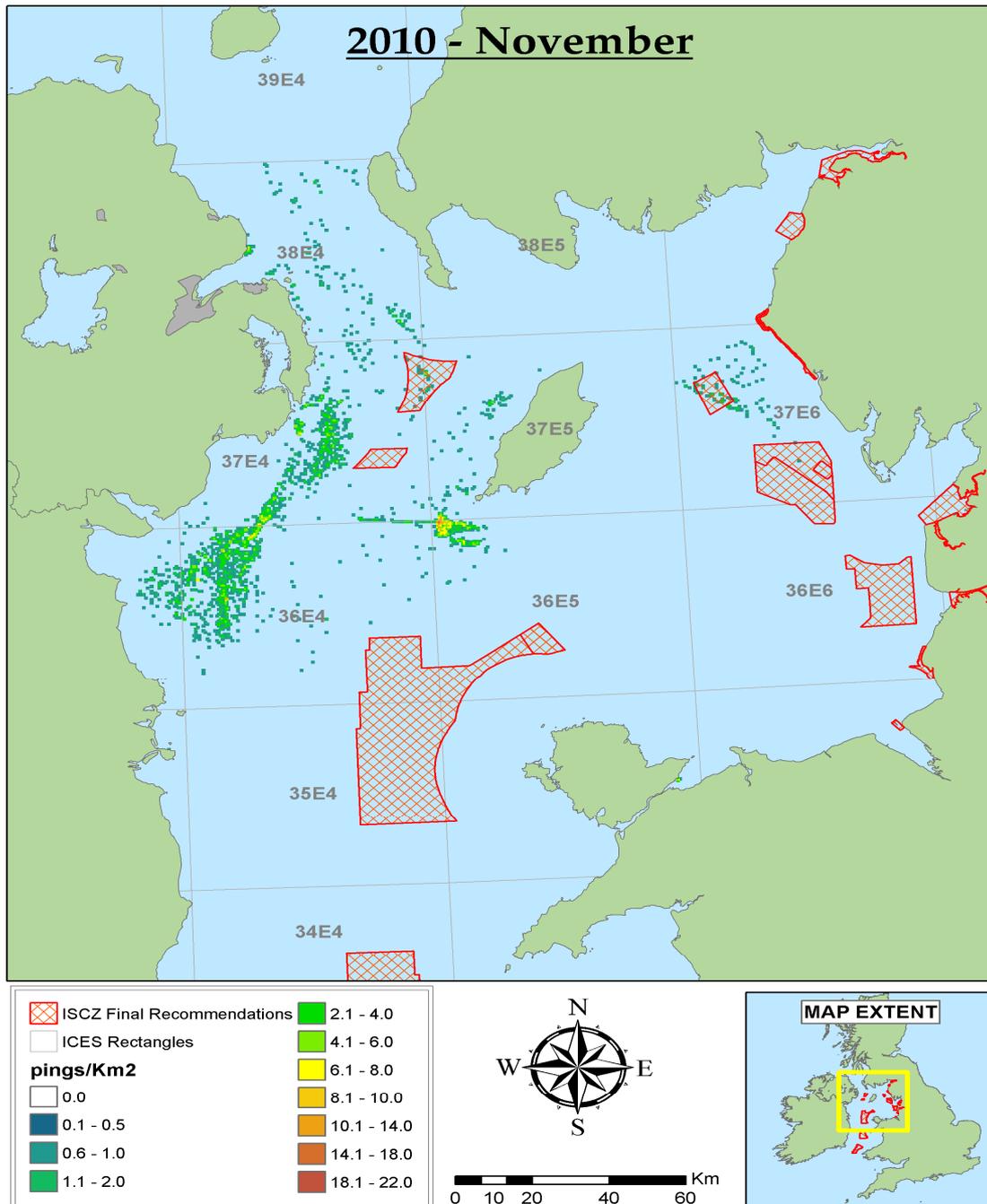
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Mud Hole	11	33E3	8
Proposed co-location zone	4	34E3	18
Slieve Na Griddle	260	34E4	10
South Rigg	791	35E3	4
West of Walney	16	35E4	58
(blank)	19632	35E5	24
Grand Total	20714	36E3	255
		36E4	9065
		36E5	112
		37E4	7828
		37E5	2236
		37E6	624
		38E4	377
		38E5	79
		38E6	16
		Grand Total	20714



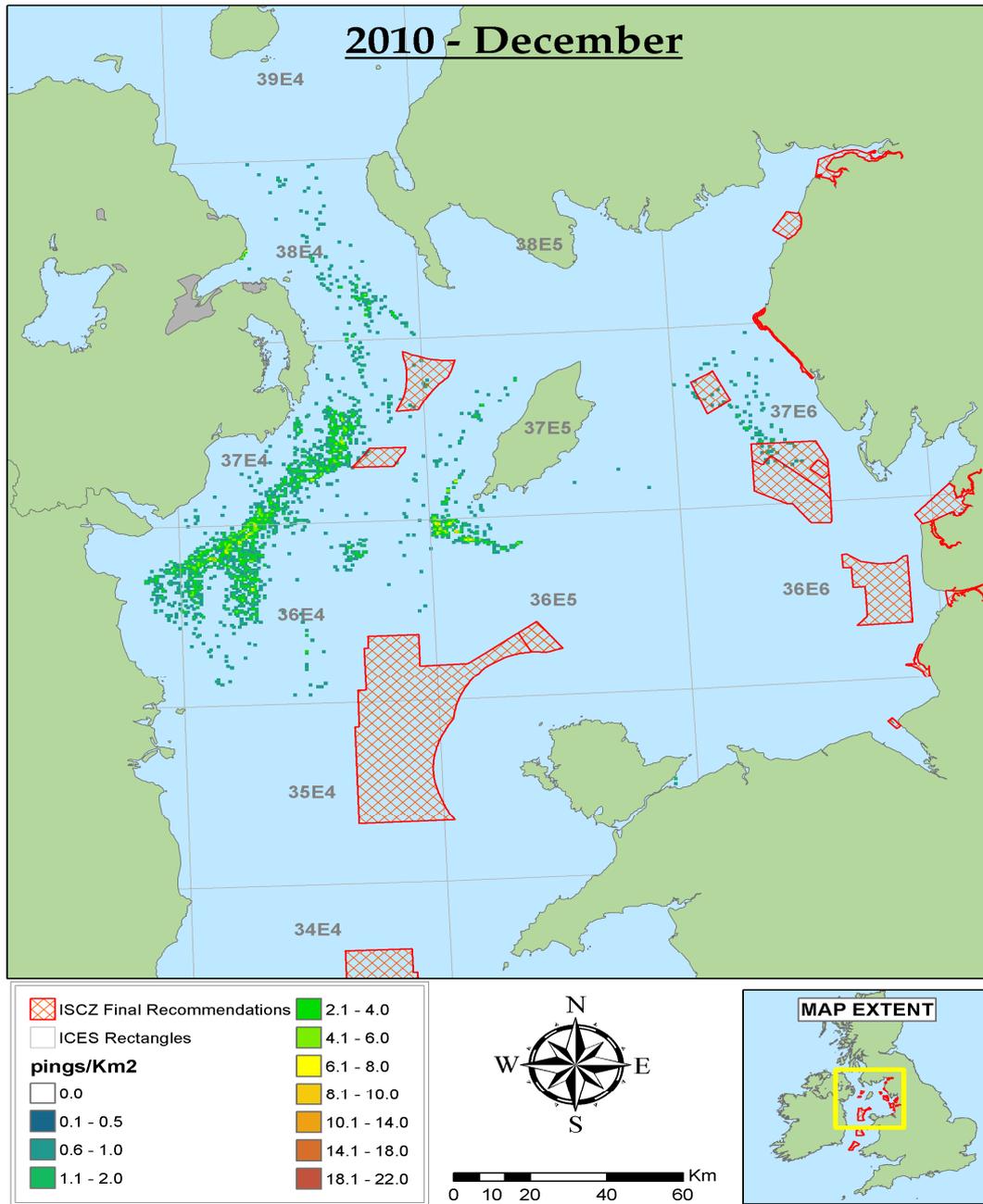
ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Mud Hole	27	33E3	10
North St George's Channel	4	34E3	44
Proposed co-location zone	3	34E4	34
Slieve Na Griddle	275	35E3	24
South Rigg	779	35E4	4
West of Walney	23	35E5	56
(blank)	11289	36E3	50
Grand Total	12400	36E4	3830
		36E5	56
		36E6	8
		37E4	5706
		37E5	1765
		37E6	504
		38E4	283
		38E5	16
		38E6	10
		Grand Total	12400



ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Slieve Na Griddle	1	34E4	4
South Rigg	467	35E3	4
(blank)	9268	35E4	28
Grand Total	9736	35E5	31
		35E6	1
		36E3	668
		36E4	4168
		36E5	62
		37E4	3634
		37E5	592
		37E6	110
		38E4	406
		38E5	6
		38E6	22
		Grand Total	9736



ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Mud Hole	108	33E2	16
South Rigg	105	35E3	4
West of Walney	6	35E5	28
(blank)	8349	36E3	394
Grand Total	8568	36E4	3144
		36E5	1080
		37E4	2446
		37E5	450
		37E6	396
		38E4	606
		38E5	4
		Grand Total	8568



ICESNAME	Total pings/k2	ICESNAME	Total pings/k2
Mud Hole	27	35E5	12
Proposed co-location zone	17	36E3	380
Slieve Na Griddle	10	36E4	3498
South Rigg	36	36E5	847
West of Walney	69	37E4	2994
(blank)	8965	37E5	375
Grand Total	9124	37E6	372
		38E4	646
		Grand Total	9124

APPENDIX B: 2010 MONTHLY VALUE ESTIMATES PER MCZ**January**

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	3.3%	3.28	136.6407	1.01	362864.23	£12,077.29	£163,626.11	£5,446.01	£17,523.30
7	37E4	1.7%	3.28	128.0976	1.01	336108.448	5587.17439 1	£112,602.25	£1,871.80	£7,458.98
1	37E6	17.2%	3.22	6.702	0.93	15297.16	£2,637.44	£4,770.55	£822.51	£3,459.95
2a	37E6	3.4%	3.22	6.702	0.93	15297.16	£527.49	£4,770.55	£164.50	£691.99
2b	37E6	3.4%	3.22	6.702	0.93	15297.16	£527.49	£4,770.55	£164.50	£691.99
							£21,356.89			£29,826.20

February

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	8.4%	3.27	202.0101	1	587097.73	£49,252.98	171857.95	14417.5587 7	£63,670.54
7	37E4	4.3%	3.27	165.624	1	467369.136	£20,152.95	89780.27	3871.32443 2	£24,024.28
1	37E6	21.0%	3.23	4.0961	0.93	10687.01	£2,242.36	8200.46	1720.63223 2	£3,963.00
2a	37E6	0.0%	3.23	4.0961	0.93	10687.012	£-	8200.46	0	£-
2b	37E6	0.0%	3.23	4.0961	0.93	10687.01	£-	8200.46	0	£-
							£71,648.30			£91,657.81

March

MCZ	ICES	% of MCZ	price/k	tail landings	price/kg	total	in MCZ	other	in MCZ	total
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	rectangles	fishing intensity within rectangle	g			Nephrops value		landings		
6	37E4 & 37E5	7.4%	3.44	229.7601	1.01	683332.72	£50,681.97	£153,767.34	£11,404.74	£62,086.71
7	37E4	4.6%	3.44	199.6143	1.01	585039.723	£26,762.28	£99,719.00	£4,561.58	£31,323.87
1	37E6	0.0%	3.19	3.8142	0.93	7670.60	£-	£1,380.94	£-	£-
2a	37E6	5.5%	3.19	3.8142	0.93	7670.6	£420.31	£1,380.94	£75.67	£495.97
2b	37E6	10.3%	3.19	3.8142	0.93	7670.60	£788.08	£1,380.94	£141.88	£929.95
							£78,652.63			£94,836.50

April

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg g	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	8.7%	3.48	261.417	1.01	681373.65	£59,281.85	199386.07	£17,347.27	£76,629.12
7	37E4	2.4%	3.48	233.7465	1.01	594458.193	£14,339.70	118670.57	£2,862.61	£17,202.31
1	37E6	13.7%	3.03	53.5527	1	131978.19	£18,092.65	14620.67	£2,004.32	£20,096.97
2a	37E6	7.3%	3.03	53.5527	1	131978.19	£9,649.41	14620.67	£1,068.97	£10,718.39
2b	37E6	6.8%	3.03	53.5527	1	131978.19	£9,032.30	14620.67	£1,000.61	£10,032.91
							£110,395.92			£134,679.70

May

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg g	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	4.0%	3.48	198.8721	1.01	£406,976.35	£16,247.66	157205.71	£6,276.10	£22,523.76
7	37E4	2.1%	3.48	168.4596	1.01	£343,969.50	7136.662269	117218.78	£2,432.05	£9,568.71
1	37E6	19.6%	3.22	66.4104	1	£139,814.49	£27,355.01	35832.06	£7,010.62	£34,365.63
2a	37E6	3.6%	3.22	66.4104	1	£139,814.49	£5,020.21	35832.06	£1,286.59	£6,306.80
2b	37E6	6.2%	3.22	66.4104	1	£139,814.49	£8,674.37	35832.06	£2,223.09	£10,897.47

						0.00	£64,433.91			£83,662.36
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June

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	3.5%	3.52	566.5047	1	£936,547.16	£32,534.19	143248.49	£4,976.23	£37,510.42
7	37E4	0.5%	3.52	535.6452	1	£884,181.87	£4,227.16	104067.1	£497.53	£4,724.70
1	37E6	30.8%	3.3	23.6904	0.98	£36,354.22	£11,189.43	5817.62	£1,790.60	£12,980.03
2a	37E6	3.1%	3.3	23.6904	0.98	£36,354.22	£1,141.78	5817.62	£182.71	£1,324.49
2b	37E6	1.4%	3.3	23.6904	0.98	£36,354.22	£502.38	5817.62	£80.39	£582.78
							£49,594.95			£57,122.42

July

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	2.4%	3.67	429.0195	1	£809,464.91	£19,151.76	175531.45	£4,153.04	£23,304.80
7	37E4	1.0%	3.67	418.0209	1	£782,703.66	£7,967.72	157133.94	£1,599.58	£9,567.30
1	37E6	8.7%	3.12	30.4728	1	£64,272.38	£5,562.03	5960.5	515.8125	£6,077.85
2a	37E6	2.4%	3.12	30.4728	1	£64,272.38	£1,545.01	5960.5	143.28125	£1,688.29
2b	37E6	0.5%	3.12	30.4728	1	£64,272.38	£309.00	5960.5	28.65625	£337.66
							£34,535.52			£40,975.89

August

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	7.9%	3.53	565.4168	1	£960,987.19	£75,530.69	487678.02	£38,330.02	£113,860.71
7	37E4	3.3%	3.53	469.0355	1	£786,352.49	£26,117.99	257165.98	£8,541.54	£34,659.53
1	37E6	8.7%	3.17	12.6021	1.01	£39,814.19	£3,445.46	2794.26	£241.81	£3,687.27
2a	37E6	2.6%	3.17	12.6021	1.01	£39,814.19	£1,020.88	2794.26	£71.65	£1,092.52
2b	37E6	0.6%	3.17	12.6021	1.01	£39,814.19	£255.22	2794.26	£17.91	£273.13

						£106,370.24				£153,573.16
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September

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	10.4%	3.4	284.5653	1.04	£541,097.43	£56,420.14	844352.64	£88,040.52	£144,460.66
7	37E4	4.8%	3.4	230.6578	1.04	£429,345.37	£20,692.25	207040.53	£9,978.29	£30,670.54
1	37E6	5.4%	3.18	12.7114	1.07	£27,719.13	£1,484.95	5335.85	£285.85	£1,770.80
2a	37E6	4.6%	3.18	12.7114	1.07	£27,719.13	£1,264.96	5335.85	£243.50	£1,508.46
2b	37E6	0.6%	3.18	12.7114	1.07	£27,719.13	£164.99	5335.85	£31.76	£196.76
							£80,027.30			£178,607.23

October

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	11.1%	3.14	43.5333	1.05	£70,875.81	£7,832.23	418576.82	£46,255.41	£54,087.64
7	37E4	0.0%	3.14	40.8879	1.05	£66,666.93	£18.35	304045.13	£83.67	£102.01
1	37E6	0.0%	3.23	1.8594	1.07	£2,909.14	£-	1376.47	£-	£-
2a	37E6	0.0%	3.23	1.8594	1.07	£2,909.14	£-	1376.47	£-	£-
2b	37E6	0.0%	3.23	1.8594	1.07	£2,909.14	£-	1376.47	£-	£-
							£7,850.58			£54,189.65

November

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	3.6%	3.37	76.2153	1.17	£149,013.67	£5,402.77	402035.53	£14,576.56	£19,979.34
7	37E4	0.0%	3.37	74.1195	1.17	£145,086.19	£-	191761.67	£-	£-
1	37E6	27.3%	3.75	3.7854	1.19	£7,342.25	£2,002.43	3527.48	£962.04	£2,964.47

2a	37E6	1.5%	3.75	3.7854	1.19	£7,342.25	£111.25	3527.48	£53.45	£164.69
2b	37E6	0.0%	3.75	3.7854	1.19	£7,342.25	£-	3527.48	£-	£-
							£7,516.45			£23,108.50

December

MCZ	ICES rectangles	% of MCZ fishing intensity within rectangle	price/kg	tail landings	price/kg	total Nephrops value	in MCZ	other landings	in MCZ	total
6	37E4 & 37E5	1.1%	4.01	65.8752	1.23	£179,372.15	£1,916.71	323443.13	£3,456.20	£5,372.91
7	37E4	0.3%	4.01	63.3036	1.23	£173,570.50	£579.73	173315.17	£578.87	£1,158.60
1	37E6	7.3%	3.86	2.0769	1.23	£4,508.91	£327.26	8979.99	£651.77	£979.03
2a	37E6	18.5%	3.86	2.0769	1.23	£4,508.91	£836.33	8979.99	£1,665.64	£2,501.97
2b	37E6	4.6%	3.86	2.0769	1.23	£4,508.91	£206.05	8979.99	£410.38	£616.43
							£3,866.08			£10,628.95

