

Fisheries Resource Access Mapping Project (FishRAMP): The Co. Down Wind Resource Zone

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August 2013

EXECUTIVE SUMMARY

This report presents an assessment of the importance to the Northern Ireland fishing industry of the Wind Resource Zone (WRZ) off the County Down coast. This work is an early output from FishRAMP being undertaken by the Agri-Food and Biosciences Institute (AFBI) and Poseidon with input from the NI seafood industry through the Seafish Northern Ireland Advisory Committee (SNIAC) as well as funding and support from Seafish and DARD.

An estimated 120 km² (or 27%) of the WRZ may be required for the planned 600 MW wind farm. The final plan and expected footprint is not yet determined.

This exercise considered four 120km² areas within the WRZ as indicative areas for location of the development: Northern (area A), Central (Area B), Southern (Area C) and an offshore area of the WRZ that overlaps parts of areas A & B (area D).

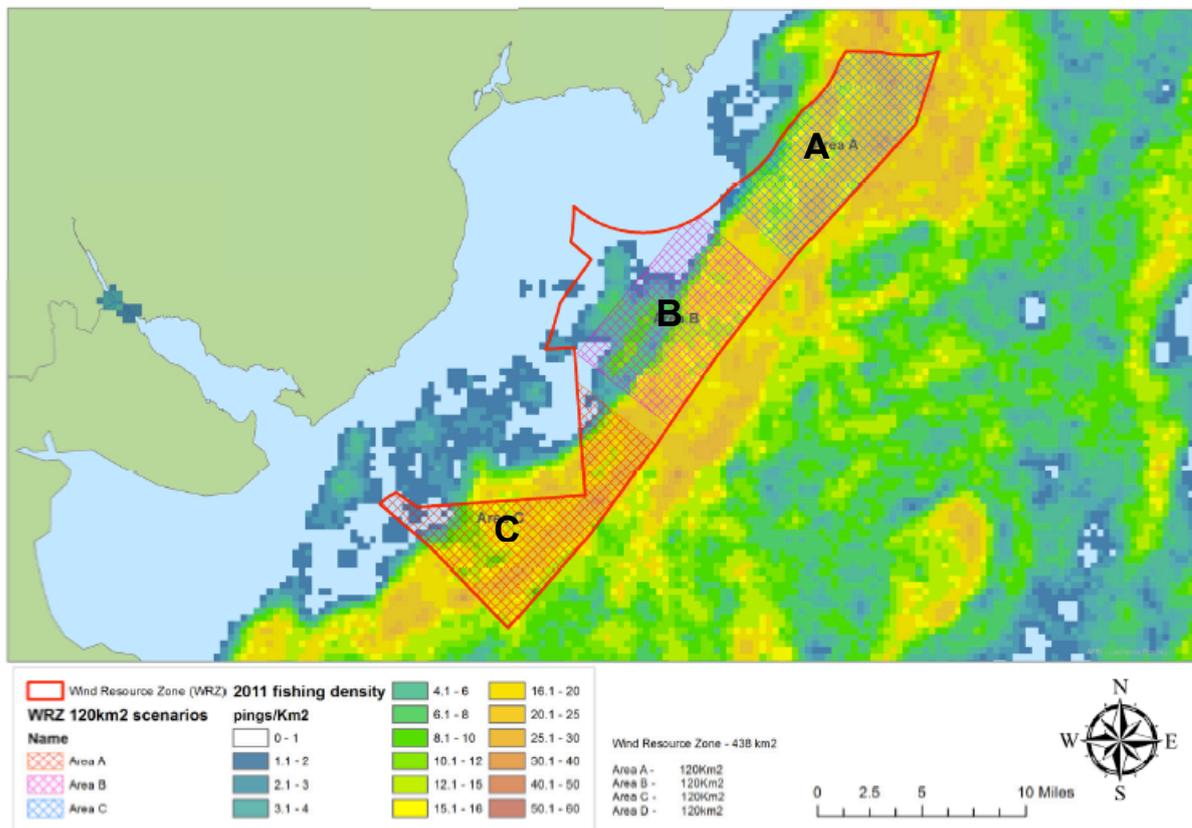


Figure A Wind Resource Zone (red) and potential wind farm development areas (A, B & C), each 120km²

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VMS data show fishing activity across 99-100% of areas A, C and D. Area B shows an average of 93% of the area being fished.

In the last five years (2007-2011) the amount of fishing activity in the WRZ has increased in all the areas considered.

Fishing intensity in Area D, containing more offshore area than areas A, B and C, is 70% greater than average fishing intensity across the WRZ as a whole.

For the trawl fleet the (2007-2011) average landed value ranges from an estimated £900,000 per annum in Area D (offshore North) to nearly £500,000 per annum in the central area B in the centre of the WRZ.

Area B in the centre of the WRZ is the only area of the four considered that has a lower than average value per km² compared to the WRZ as a whole.

Spatial data on pot fishing effort is not available and therefore estimated values are not possible. Based on the numbers of pots landed per port, however, it can be assumed that Area C in the South is likely to account for the greatest value due to its proximity to Kilkeel.

As with the trawl fleet, the level of potting activity in the central area B is assumed to be less as it is further from shore and data indicates fewer pots being landed to adjacent ports (Ardglass/Annalong) compared to Kilkeel in the south and Portavogie in the north.

This document reports the estimated value of catches from certain areas. It does not estimate the impact on revenue resulting from a development in these areas, which can also have positive impacts for some vessels through providing vessel services to developers.

Overall impact will depend upon the scale and extent of displacement from these important fishing grounds.

Developments can impact vessel owners through lost revenue, but will also impact crew, processors, ancillary industries and their associated employees and local communities.

Seasonal fishing patterns are dictated by the need to disperse effort across grounds throughout the year. Displacement from wind farm areas would result in additional pressure on remaining grounds that are already fished, which could lead to lower catch per unit effort and may be unsustainable in the longer term.

These aspects of displacement and impact are discussed in the full FishRAMP report.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY.....	0
SECTION 1: POSEIDON WIND RESOURCE ZONE ECONOMIC ANALYSIS	3
INTRODUCTION.....	3
<i>Background</i>	3
<i>Objective</i>	4
METHODOLOGY	4
<i>Approach</i>	4
<i>Scope</i>	4
<i>Methodology</i>	5
RESULTS.....	6
<i>Fishing intensities</i>	6
<i>Trawler fleet</i>	7
<i>Potting fleet</i>	8
<i>Impacts</i>	8
SECTION 1 CONCLUSIONS.....	10
SECTION 2 : AFBI WIND RESOURCE ZONE MAPPING STUDY, 2013	11
SUMMARY.....	11
DATA AND METHOD DETAILS.....	12
THE CO. DOWN WIND RESOURCE ZONE	13
120KM ² PLACEMENT SCENARIOS	15
SECTION 2 CONCLUSIONS.....	19

TABLE OF FIGURES

FIGURE 1 WIND RESOURCE ZONE (RED) AND POTENTIAL WIND FARM DEVELOPMENT AREAS (A, B & C), EACH 120KM ²	3
FIGURE 2 WRZ AND INDICATIVE DEVELOPMENT AREA D	5
FIGURE 3 PERCENTAGE OF ANNUAL TOTAL FISHING INTENSITY PER AREA 2007-2011	7
FIGURE 4 OUTLINE OF THE WIND RESOURCE ZONE (WRZ) WITH THE UNDERLYING VMS DENSITY ANALYSIS FOR 2011	13
FIGURE 5 VMS DATA AND THE WRZ (HIGHLIGHTED IN PINK)	14
FIGURE 6 AMOUNT OF VMS ACTIVITY AND VMS INTENSITY WITHIN WRZ AREA.....	15
FIGURE 7 THREE SCENARIO AREAS (120KM2 EACH)	16
FIGURE 8 AREA D SCENARIO.....	17
FIGURE 9 TOTAL SUM OF PINGS/KM2 IN EACH AREA PER YEAR (2007-2011)	18
FIGURE 10 % OF TOTAL ANNUAL FISHING INTENSITY WITHIN EACH AREA PER YEAR (2007-2011)	18

Section 1: Poseidon Wind Resource Zone Economic Analysis

INTRODUCTION

Background

This report presents an assessment of the importance to the Northern Ireland fishing industry of the Wind Resource Zone (WRZ) off the County Down coast.

This work is an early output from the Fishing Resource Access Mapping Project (FishRAMP) being undertaken by the Agri-Food and Biosciences Institute (AFBI) and Poseidon with input from DARD, Seafish and the NI seafood industry through the Seafish Northern Ireland Advisory Committee, which considers many potential spatial constraints facing the Northern Ireland fishing industry from offshore developments and proposed marine protected areas.

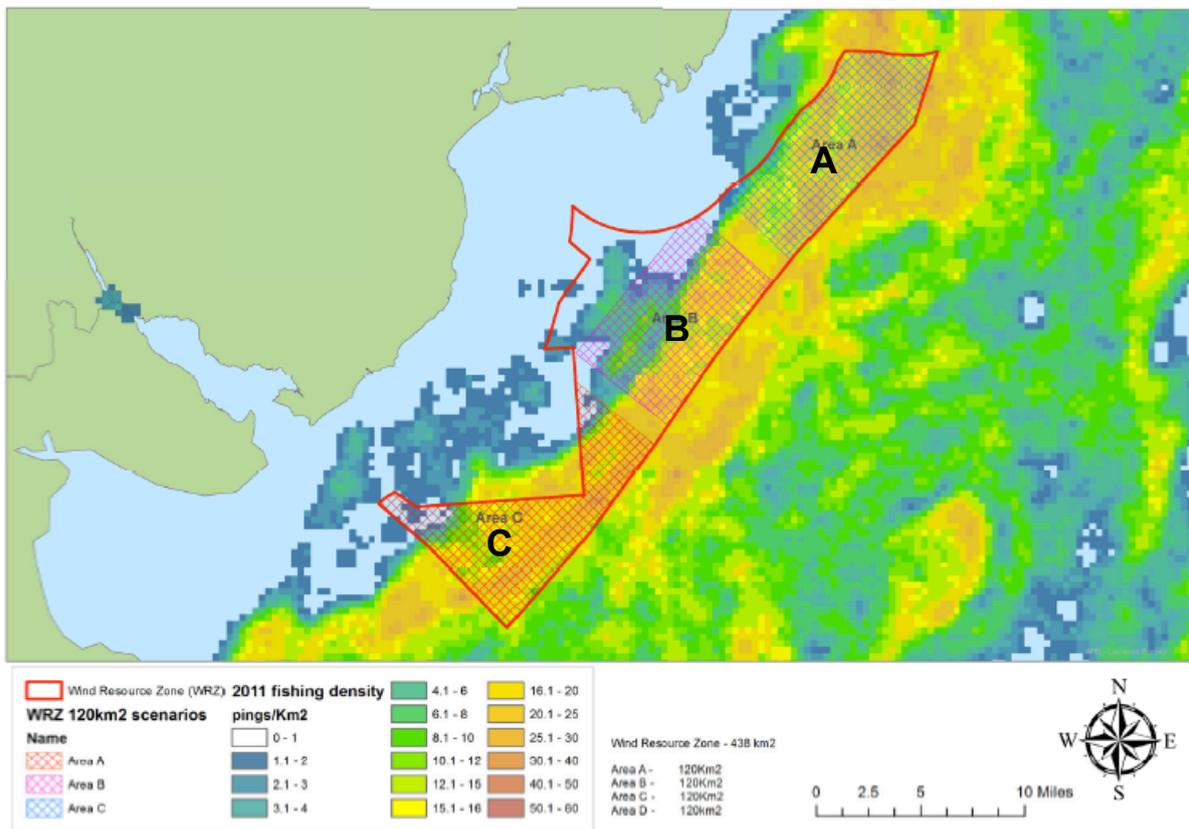


Figure 1 Wind Resource Zone (red) and potential wind farm development areas (A, B & C), each 120km²

Source: AFBI, 2013

First Flight Wind (FFW) is exploring the potential to develop a 600MW wind farm somewhere within the WRZ. The size and location of the area to be developed within the WRZ will be defined by the size, number and spacing of turbines proposed as well as any physical or operational constraints identified across the WRZ. For this research, an early estimate suggested by FFW of approximately 120 km² is used as an estimate of the footprint for the

development area (Figure 1), which represents around 25% of the WRZ (which has a total area of 438 km²).

Objective

The objective of this work is to assess indicative, comparative values associated with potential development areas within the WRZ.

The report will estimate the proportion of total fleet revenue associated with the proposed areas. Total fleet revenue is based on the total annual value of landings for the wind farm areas within the WRZ (not the whole WRZ), but note that this varies year on year due to various factors affecting the fleet's fishing opportunities & market prices.

METHODOLOGY

Approach

The analysis involved two stages:

1. AFBI overlaid vessel monitoring system (VMS) data for Northern Ireland (NI) fishing vessels over 15m with the WRZ and four indicative 120km² areas (see Figures 1 and 2).
2. Poseidon used DARD landings data to determine average landed values for relevant fleet segments and estimates the proportion attributable to the WRZ and the four indicative development areas based on AFBI estimates of fishing intensity.

Scope

The scope of this assessment is limited to:

- The NI fleet above 15m in length (*Nephrops* is the main target species, but whitefish, scallops and other species make up important additional components). UK, ROI or other nationality vessels and vessels from other regions and countries that fish in the WRZ are not included. The activity of the potting fleet in the WRZ is mentioned, but will be considered further in the full FishRAMP report.
- The value of catch associated with the WRZ located in the Irish Sea off the County Down coast. A valuation of other Irish Sea renewable development areas on this fleet is not included in this report, but will be considered in the full FishRAMP report.
- Data from the years 2007 to 2011. 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* (although prices have recovered in recent years). 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.

In light of the above, the following should be noted:

- The valuation is based on average values per area that are assumed to be proportional to fishing intensity. Consultation with the industry is necessary to explore the relative scale and quality of the catch from the areas concerned, e.g. different sized *Nephrops* or different catch composition (e.g. more or less by-catch of high value whitefish).

- These grounds are accessible for Nephrops vessels under 15m and therefore, while not represented in the VMS, it is assumed that the same relative fishing intensities relate to this fleet component. This may be an underestimate as these grounds close to port may be comparatively more important to the smaller vessels than the over 15m vessels, some of which fish further afield.
- The proposed development area has not been reported by FFW. Those used in the report are indicative 120km² areas in the (A) northern, (B) central and (C) southern areas of the WRZ. A fourth area (D, see Figure 2) is also presented in the northern on the eastern edge of the zone, avoiding the western (inshore) edge of the WRZ. These are intended to explore the differing levels of activity within the zone and therefore the differing impacts dependent on location. They do not represent known or expected development areas.

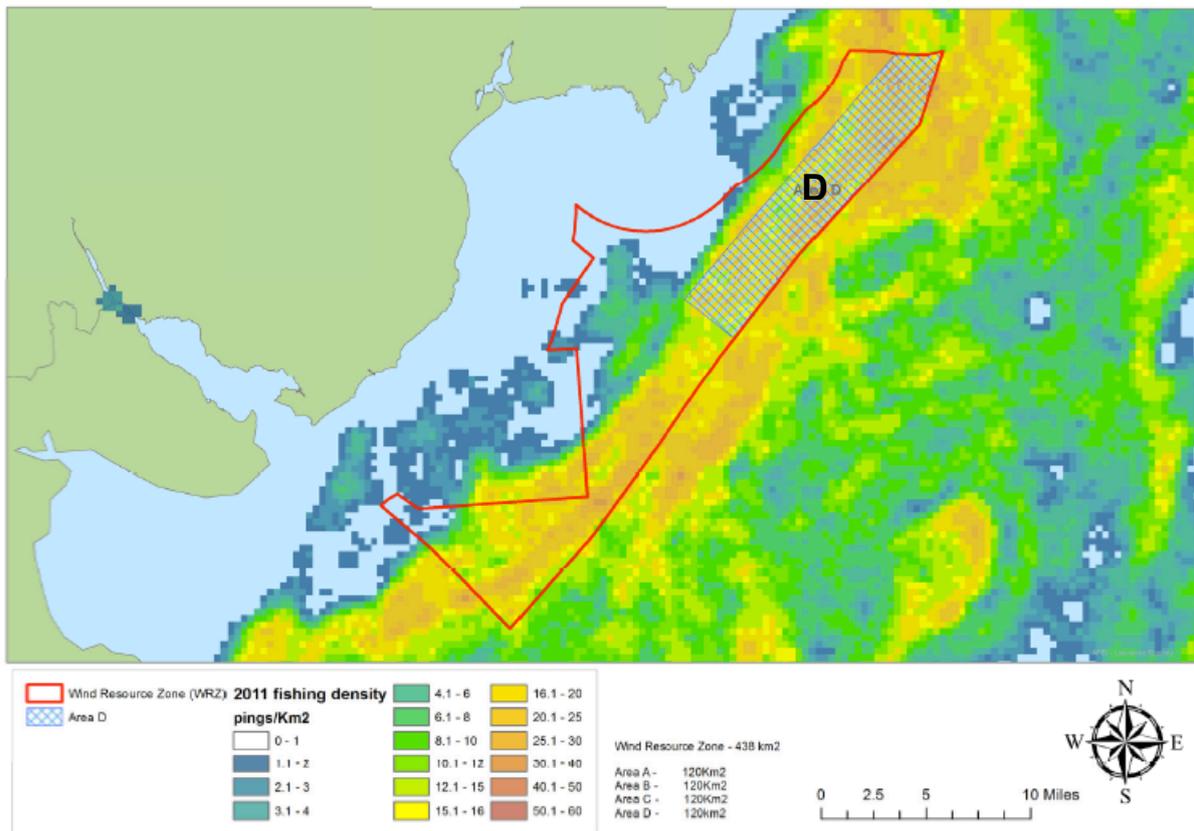


Figure 2 WRZ and indicative development area D

Source: AFBI, 2013

Methodology

Fishing effort

VMS data on the over 15m fleet were provided by DARD for the years 2007 to 2011 and interpreted in GIS by AFBI. 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'.

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 of all data around ports that may have appeared as fishing were made to reduce bias; this was done on a case-by-case basis. The same process was applied to any data that appeared to be from sea lough mussel dredging.

Point density analysis was done using ArcGIS on each year's total fishing data.

The activity in the WRZ and the indicative development areas as a proportion of total fleet activity was then determined.

Landings data

DARD provided landings data for the years 2007-2011 by species, vessel category (under 15m and over 15m), homeport and ICES rectangle. The value of landings in the areas is calculated by applying the estimated fishing intensity in the WRZ as a proportion of total estimated activity to the total value of catch. The calculations exclude the value of mackerel landings, which originate outside the Irish Sea, and crab & lobster, which are from potting vessels not in the VMS data.

The above 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 currently available data.

RESULTS

Fishing intensities

Figure 3 illustrates the percentage of annual fishing intensity (a proxy for effort) within the four indicative development areas for NI over 15m vessels. The following can be determined:

- The % of annual intensity has remained relatively stable, although Area C (the southern part of the WRZ) has become more significant in recent years (2010-11);
- Area A and Area D (both in the north of the zone) account for the highest % of fishing activity, averaging 4.69% and 4.86% of fishing intensity 2007-2011 respectively. Area D shows marginally more fishing activity by the over 15m fleet than Area A;
- Area B, the central area, shows the lowest level of fishing intensity, averaging 2.67% between 2007-2011.

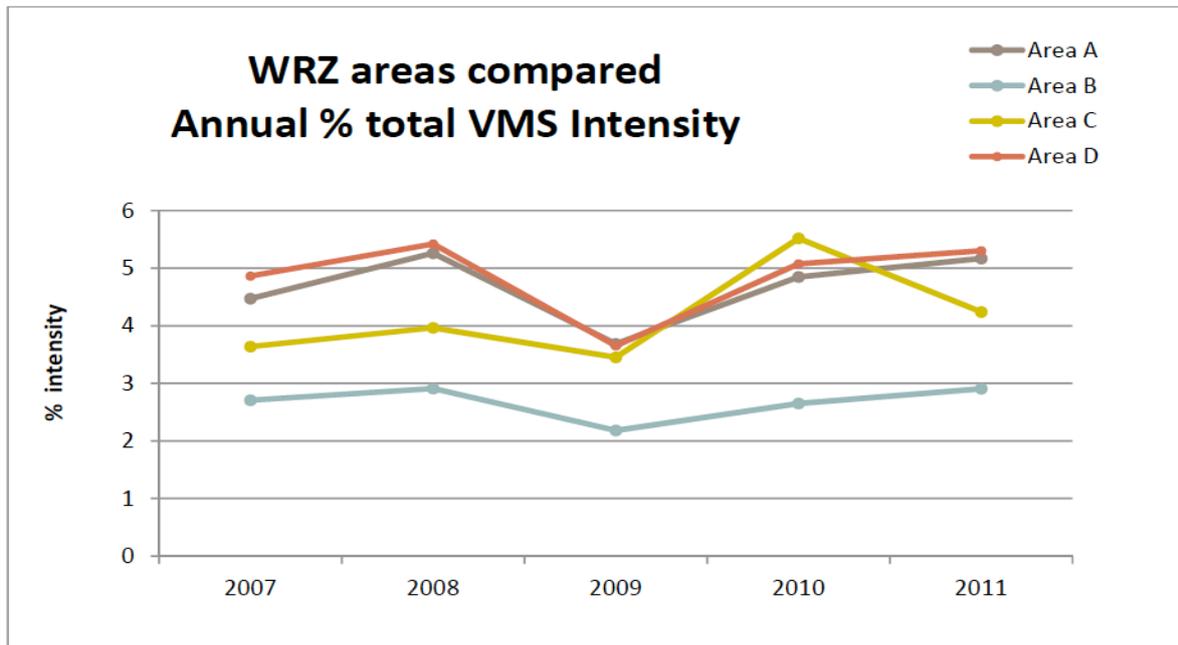


Figure 3 Percentage of annual total fishing intensity per area 2007-2011

Source: AFBI, 2013

Trawler fleet

Table 1 presents estimates of landed values by NI trawlers landing into NI ports from the indicative development areas. These figures exclude mackerel landings, which are not caught in the Irish Sea, and crab & lobster landings, which are landed by the NI potting fleet and discussed in the section below. The remaining landings do, however, account for 83% of total landed value.

Table 1 Estimated landed values by NI trawl fleet from WRZ areas*

Year	Whole WRZ	Area A	Area B	Area C	Area D
2007	£1,787,873	£826,918	£500,536	£672,731	£899,369
2008	£2,030,391	£972,659	£537,940	£733,086	£1,002,436
2009	£1,544,531	£681,498	£403,404	£638,335	£675,229
2010	£2,131,908	£896,555	£490,029	£1,020,495	£938,483
2011	£2,173,448	£955,663	£537,387	£784,038	£980,661
5 year average	£1,933,630	£866,659	£493,859	£769,737	£899,236

*excludes mackerel and potting fleet (crab & lobster) landings

source: Poseidon analysis

The table above illustrates the significant variation in landed values between the four indicative development areas considered. The fishing intensity (and so value of landings) attributed to Area D is 70% greater than the average for the WRZ as a whole. While the

120km² areas each represent 27% of the 438km² of the whole WRZ, the values are above this for all areas, other than the central Area B:

Area A	45%
Area B	26%
Area C	40%
Area D	47%

Potting fleet

The potting fleet is not captured within the VMS data and is therefore not included in the valuations above.

Available data on the potting fleet cannot accurately estimate fishing effort and therefore value per area. However a comparative indication can be considered using landed pots per port, derived from DARD collation of monthly shellfish returns.

While most potting effort occurs within six miles of shore and only a small proportion of the WRZ lies within the six-mile limit potting effort is known to occur further offshore, there is likely to be overlap between potting effort and the WRZ. There is some delineation between grounds that are regularly trawled and where pots are set, but seasonal variations mean that some overlap is possible.

It is also noted that industry has reported recent substantial price increases, particularly for *Nephrops* and lobster (partly due to poor Scottish landings). The historic values attributed to inshore landings may therefore underestimate current values.

There is a concentration of potting effort associated with Kilkeel. Therefore despite the lack of potting effort data, it can be assumed that the southern Area C, which is closest to Kilkeel and closest to shore, is likely to represent the area with greatest potting effort and therefore potentially of greatest value to the potting fleet. Data indicate fewer pots being landed to adjacent ports (Ardglass/Annalong) compared to Kilkeel in the south and Portavogie in the north. As with the trawl fleet, therefore the level of potting activity in the central area B is assumed to be less as it is further from shore.

Similarly Area D being on the offshore side of the WRZ and representing the greatest value for the trawl fleet is likely to have comparatively lower level of landings from the potting fleet.

The comparative importance of these areas to potting with the most important first is therefore expected to be: C, A, B, D.

Impacts

This document reports the estimated value of catches from certain areas. It does not estimate the impact on revenue resulting from a development in these areas. The Environmental Impact Assessment (EIA), which should involve extensive consultation, would

be used to assess the significance of impacts, which are likely to extend beyond a potential loss of revenue. There is also the potential for benefits to the sector resulting from renewables developments. However ancillary services (guard work etc.) should be clearly distinguished from the impact on commercial fisheries.

A wind farm may have several impacts on commercial fisheries, including:

- Damage or disturbance to target resources
- Exclusion from the whole or certain areas of the development
- Displacement of fishing effort (potentially leading to reduced catches, unsustainable fishing effort in remaining areas and increased gear conflict)
- Additional gear snagging risk
- Additional steaming times (reducing profit with increased fuel costs)

The above impacts may occur over a short timescale (construction/decommissioning) or a longer timescale (operation), which may be localised in their nature or impact further afield.

Displacement

One impact that does extend further afield is displacement; this not only impacts vessels fishing in the affected area, but also those vessels fishing where excluded vessels are displaced to. A key determinant in the extent of displacement is whether fishing will be permitted and operationally possible within the array. The larger turbines favoured in Round 3 developments can result in fewer, more widely spaced turbines that may be more than 1km apart. With sufficient cable burial, trawling within wind farms is feasible. Such project design details are therefore critical to determining the extent of impacts such as displacement.

Displacement from wind farm areas would result in additional pressure on the grounds that remain open. The NI fleet is already targeting these areas with the bulk of fishing intensity seen in the near-shore grounds. Seasonal fishing patterns are dictated by the need to disperse effort across grounds throughout the year. Forcing vessels off important grounds will result in vessels fishing inshore grounds harder, which would lead to lower catch per unit effort and may be unsustainable in the longer term.

Socio-economics

Marine Management Organisation (MMO) figures for 2011 give 578 full time NI fishermen and 688 in total (full and part-time). The NI trawl fleet represents the vast majority of jobs in the NI catching sector.

The NI processing sector employs around 500 full time equivalents (FTE), mostly in scampi processing. Around 80% of live weight equivalent (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 75% of whole prawns landed by the fleet are also purchased by these processors. 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.

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. Any significant loss of landed value would have a major impact on the NI fishing industry and the sectors and communities that depend upon it. Those impacts would be felt acutely in the three main fishing ports of Portavogie, Ardglass and Kilkeel (the largest port) respectively located west of the northern, central and southern areas of the WRZ.

These figures illustrate that developments impact vessel owners through lost revenues, but also by crew, processors, ancillary industries and their associated staff and local communities.

SECTION 1 CONCLUSIONS

- An estimated 120 km² (or 27%) of the Wind Resource Zone may be required for the planned 600 MW wind farm. The final plan and expected footprint is not yet determined.
- This exercise considered four 120km² areas within the WRZ as indicative areas for location of the development: Northern (area A), Central (Area B), Southern (Area C) and North-central (area D).
- VMS data show fishing activity across 99-100% of areas A, C and D. Area B shows an average of 93% of the area being fished.
- In the last five years (2007-2011) the amount of fishing activity in the WRZ has increased in all the areas considered.
- Fishing intensity in Area D, containing more offshore area than areas A, B and C, is 70% greater than average fishing intensity across the WRZ as a whole.
- For the trawl fleet the (2007-2011) average landed value ranges from an estimated £900,000 per annum in Area D (offshore North) to nearly £500,000 per annum in the central area, B.
- Area B in the centre of the WRZ is the only area of the four considered that has a lower than average value per km² compared to the WRZ as a whole.
- Spatial data on pot fishing effort is not available and therefore estimated values are not possible. Based on the numbers of pots landed per port, however, it can be assumed that Area C in the South is likely to account for the greatest value due to its proximity to Kilkeel.
- As with the trawl fleet, the level of potting activity in the central area B is assumed to be less as it is further from shore and data indicates fewer pots being landed to adjacent ports (Ardglass/Annalong) compared to Kilkeel in the south and Portavogie in the north.
- This document reports the estimated value of catches from certain areas. It does not estimate the impact on revenue resulting from a development in these areas, which will depend upon the scale and extent of disturbance to and displacement from these important fishing grounds. There is also the potential for positive impacts on non-fishing revenue for certain vessels in providing vessel services to developers.
- Seasonal fishing patterns are dictated by the need to disperse effort across grounds throughout the year. Displacement from wind farm areas would result in additional pressure on remaining grounds that are already fished, which could lead to lower catch per unit effort and may be unsustainable in the longer term.

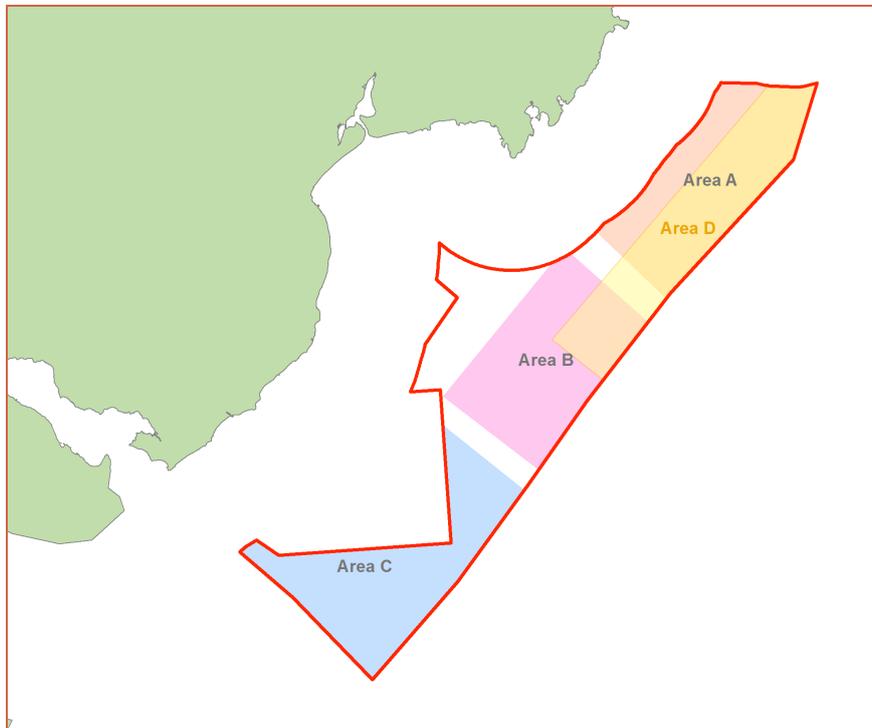
Section 2 : AFBI Wind Resource Zone Mapping Study, 2013

SUMMARY

Fishing intensity in the NI wind resource zone (WRZ) has steadily increased from 2007. The area fished in 2011 represents over 95% of the total designated area. It appears that there is increasing fishing pressure within this area.

In 2011, almost 12% of fishing intensity in over 15m boats registered in Northern Ireland was within this area.

The required size for the windfarm will be approximately 120km² which represents around 25% of the designated resource zone (438km²). Four scenarios were explored to see what the impact may be if the 120km² site was placed at different areas within the WRZ.



Four areas 120km² areas investigated

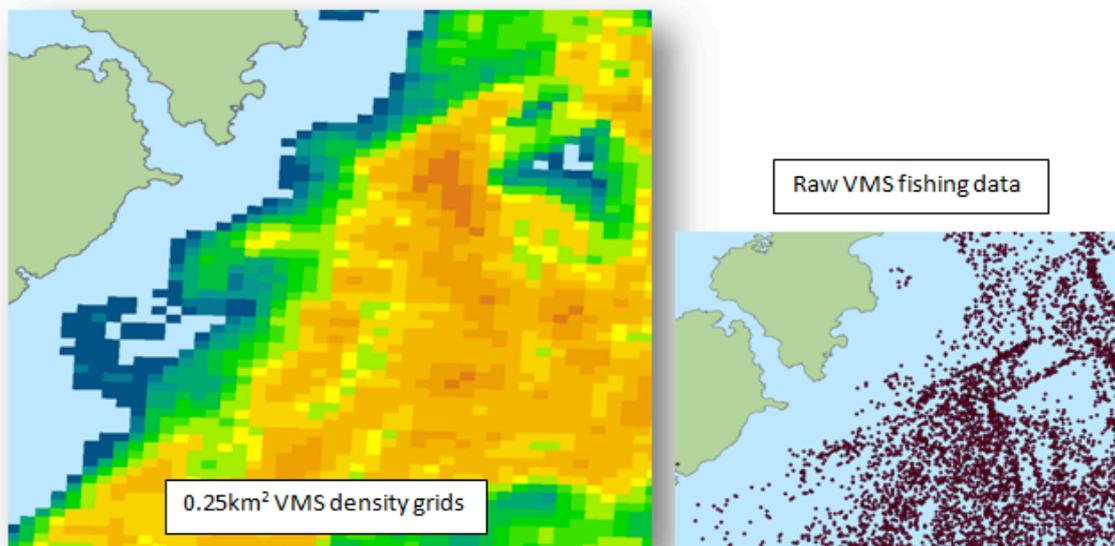
Area B has proved to be the area with least impact. Marginally less of the area is fished compared to the other sites and the percentage of fishing intensity within this area is less than 3% of the total annual intensity each year.

DATA AND METHOD DETAILS

Anonymised Vessel Monitoring System (VMS) data was provided by DARD. Pings (signals from a vessel's VMS stating its position) were collected every two hours from vessels over 15 metres. This was for the whole Northern Irish fleet.

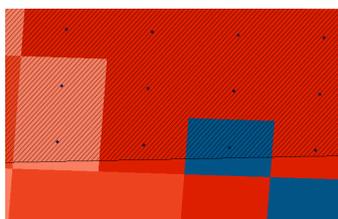
VMS densities were derived for each year 2007-2011, from all data points designated as fishing from each year. Fishing was determined by speed – between 2 and 6 knots inclusive. Exclusions of all data around ports that may have appeared as fishing were made to reduce bias; this was done on a case-by-case basis.

The cell sizes for the densities are 500x500m grids – creating 0.25Km² grids.



Density values for each cell were derived as pings per Km², though this should be read as a relative index of pressure as opposed to representing the actual number of pings in each square kilometre.

The four 120km² grids have been investigated to see what fishing pressure is in those areas and how it has changed between 2007 and 2011



The area of each 120km² site within the WRZ occupied by the VMS each year is approximate due to the scale of the VMS grids. If more than 50% of a grid falls into the investigated area the whole 0.25Km² grid is counted.

Results described below:

Area (Km ²)	Total area of VMS grids in investigated area
Mean density/Km ²	Mean density across investigated area
% intensity	% intensity of total annual VMS
Total pings/km ²	Sum of densities in investigated area (not actual number of VMS pings)

THE CO. DOWN WIND RESOURCE ZONE

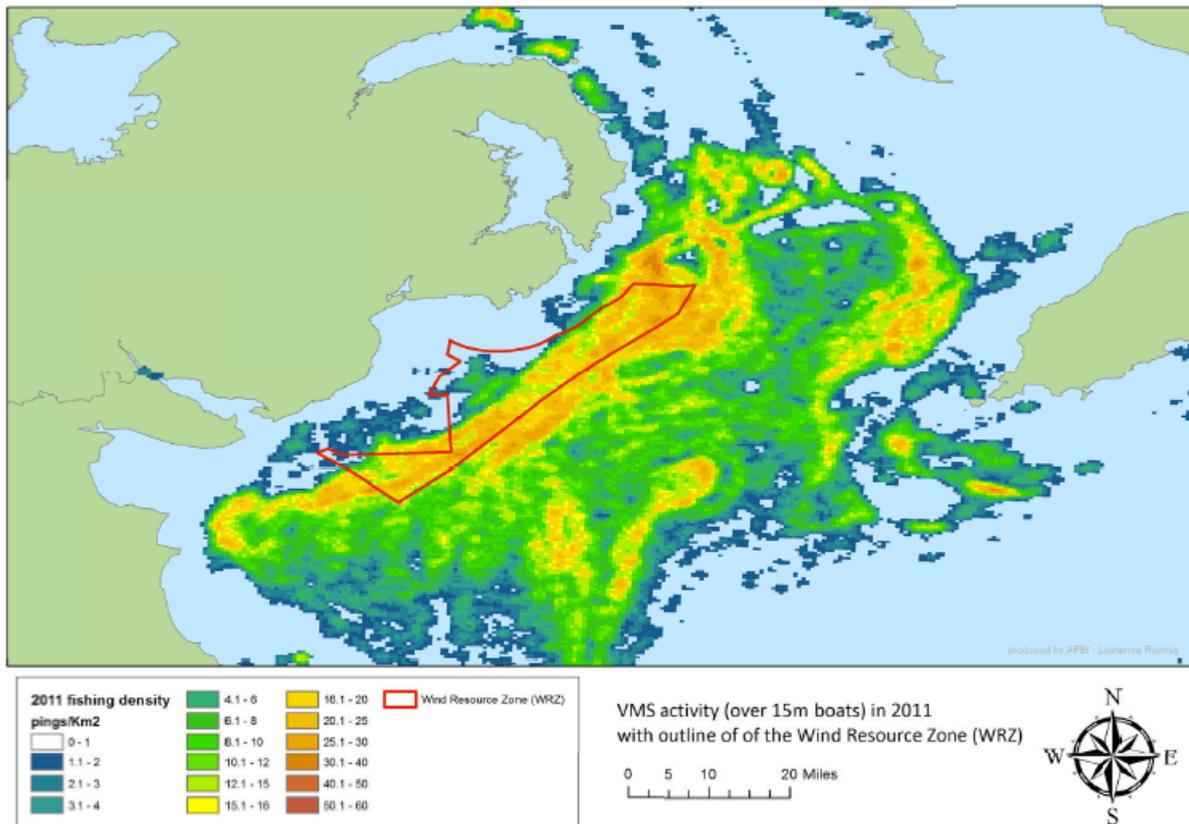


Figure 4 Outline of the Wind Resource Zone (WRZ) with the underlying VMS density analysis for 2011

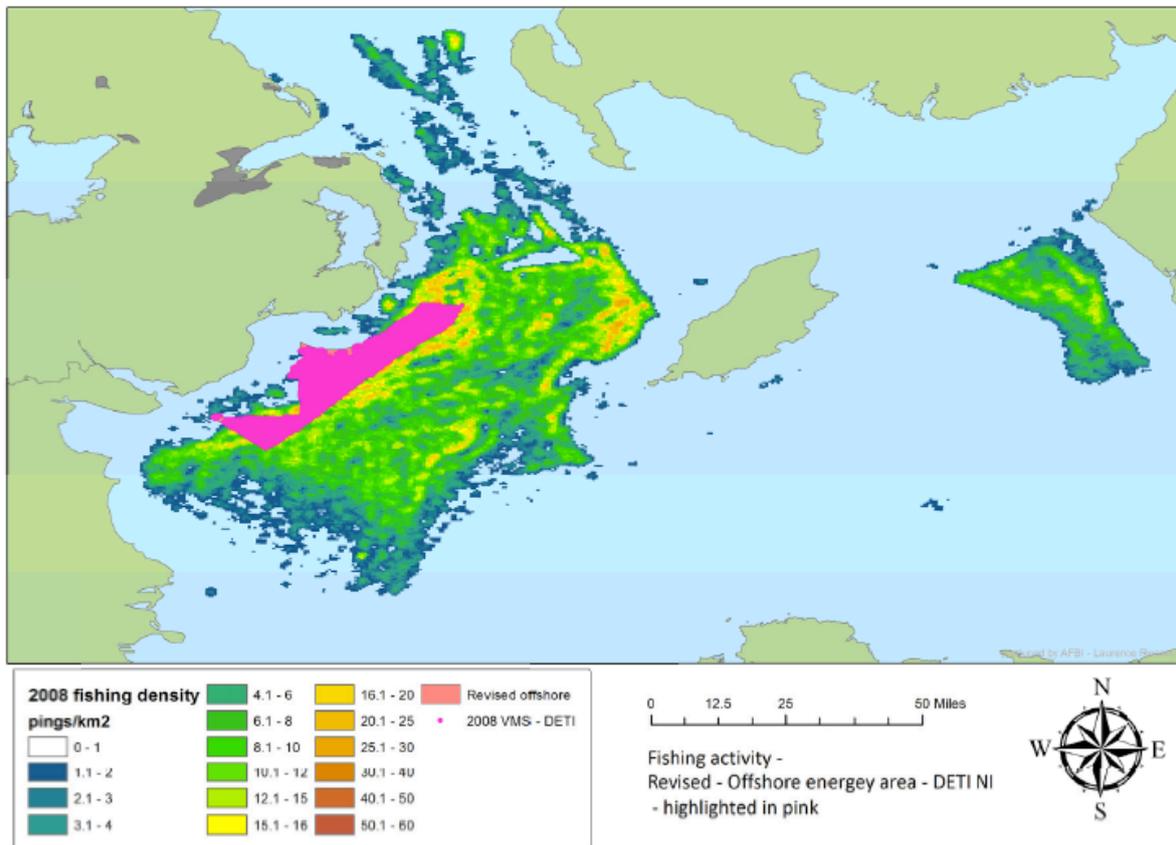


Figure 5 VMS data and the WRZ (highlighted in pink)

Table 2 Wind Resource Zone results:

Year	Area (Km ²)	Mean Density (mean total ping /Km ²)	% of annual Intensity	Total pings/km ²
2007	377.63	37.20	9.67	14788.04
2008	400.19	46.60	10.98	19628.58
2009	400.90	41.23	8.35	17398.18
2010	380.71	52.29	11.53	20954.66
2011	422.04	58.45	11.75	25968.04

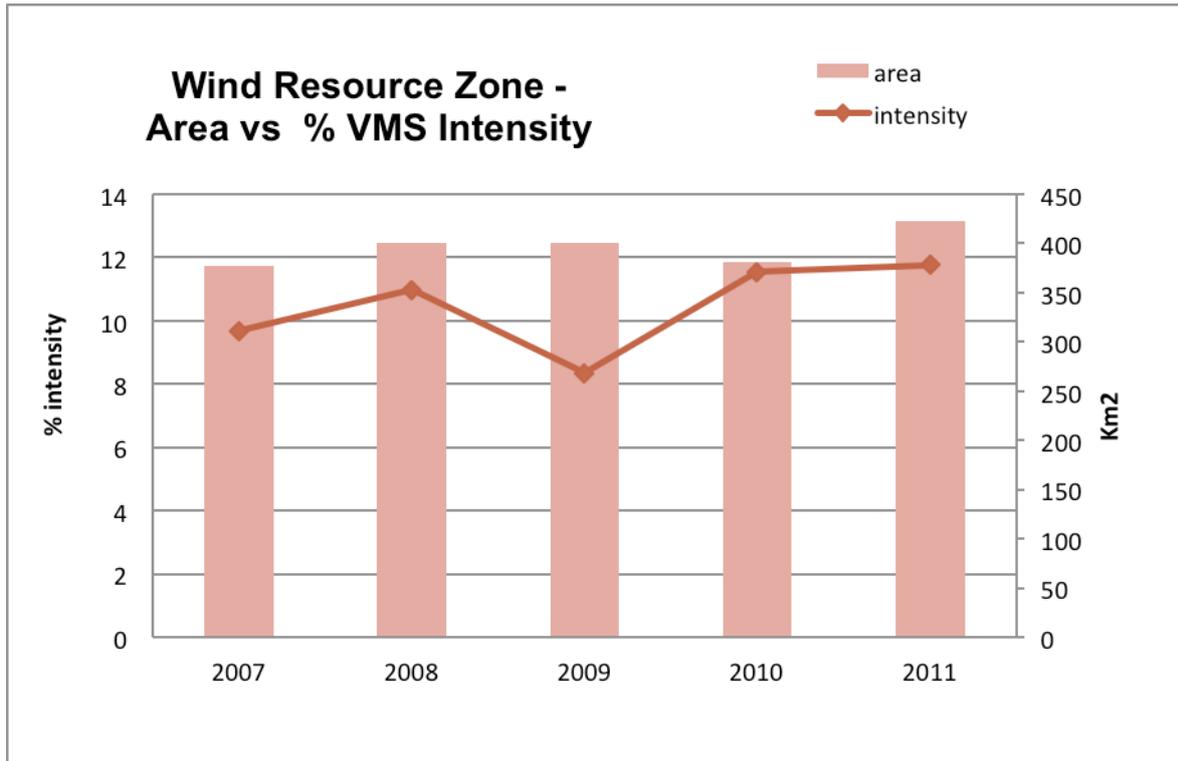


Figure 6 Amount of VMS activity and VMS intensity within WRZ area

Despite a dip in 2009, fishing intensity in the Wind Resource Zone has shown a general increase from 2007. The total area fished within area has remained roughly the same but has also increased from 2007.

The area fished in 2011 over 95% of the total Wind Resource Zone area was actively fished.

120KM² PLACEMENT SCENARIOS

The required size for the windfarm will be approximately 120Km², dependant on the final design, which represents around 25% of the designated resource zone (438km²). Four scenarios were explored to see what the impact may be if the 120km² site was placed at different areas within the WRZ. The first three are **Area A**, **Area B** and **Area C** – see figure 7. The fourth, **Area D**, is described in figure 8.

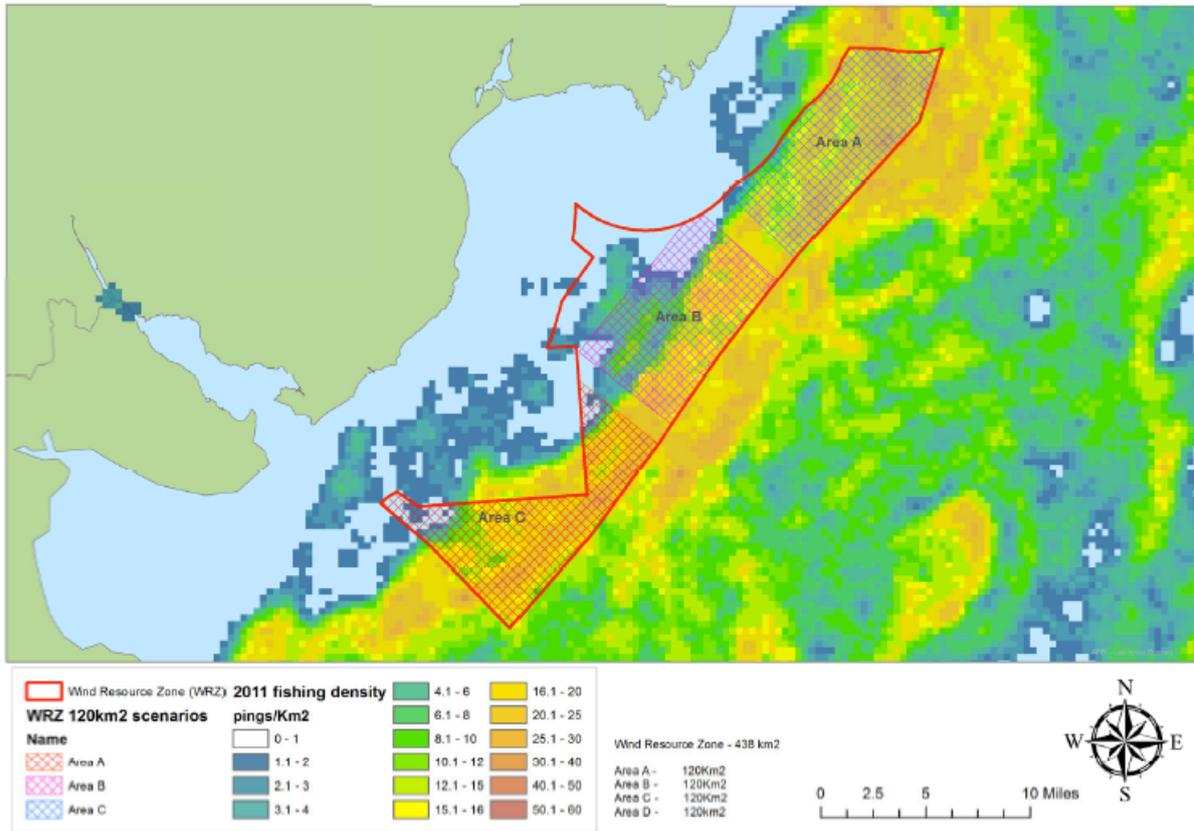


Figure 7 Three scenario areas (120km² each)

Table 3, 4 & 5 – 120km² scenario results

Area A:

Year	Area (Km ²)	Mean Density (mean total ping /Km ²)	% of annual Intensity	Total pings/km ²
2007	120.75	46.72	4.47	5642.04
2008	119.75	64.77	5.26	7756.58
2009	119.00	53.21	3.69	6332.46
2010	120.50	60.33	4.85	7269.24
2011	120.75	78.00	5.17	9418.79

Area B:

Year	Area (Km ²)	Mean Density (mean total ping /Km ²)	% of annual Intensity	Total pings/km ²
2007	109.50	31.19	2.71	3415.15
2008	116.00	36.98	2.91	4289.86
2009	116.75	32.11	2.18	3748.42
2010	106.75	37.22	2.65	3973.14
2011	111.00	47.71	2.91	5296.36

Area C:

Year	Area (Km ²)	Mean Density (mean total ping /Km ²)	% of annual Intensity	Total pings/km ²
2007	118.75	38.65	3.64	4590.03
2008	116.25	50.29	3.96	5846.08
2009	118.75	49.95	3.45	5931.39
2010	118.00	70.12	5.52	8274.15
2011	118.50	65.21	4.24	7727.29

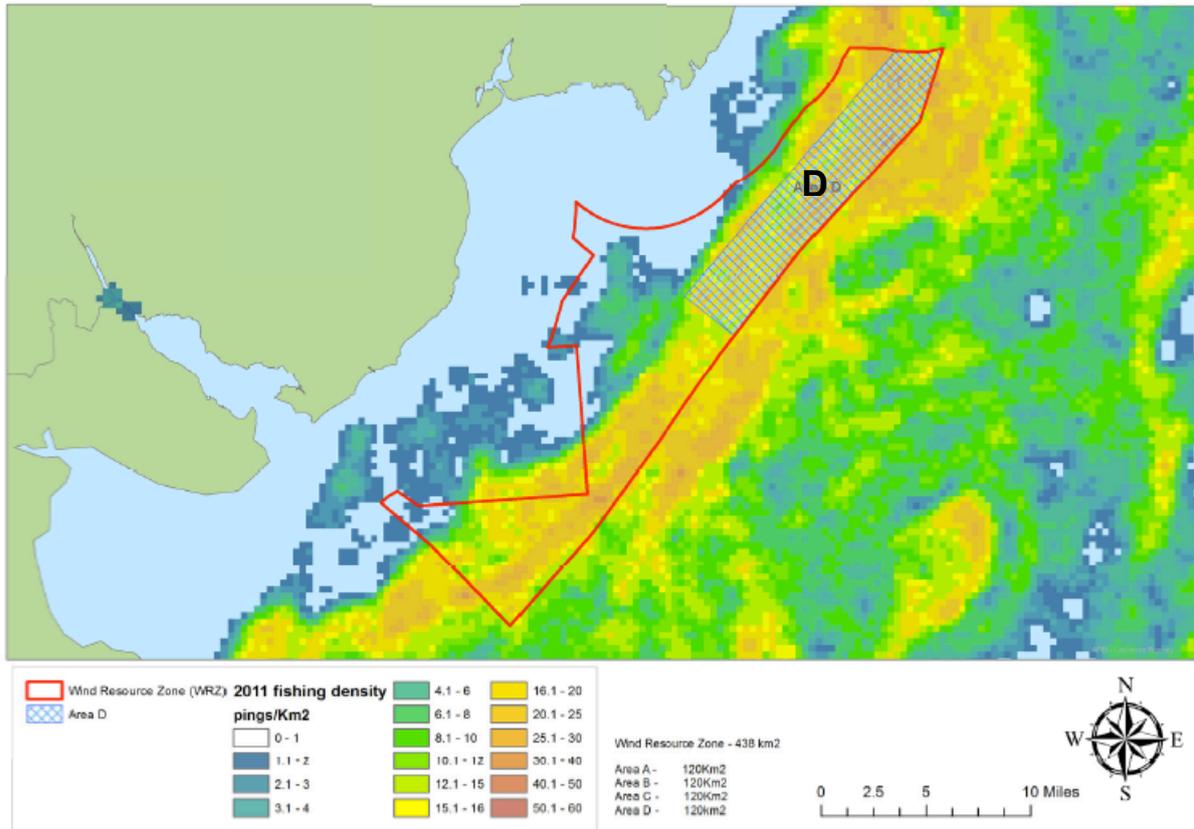


Figure 8 Area D scenario

Table 6 120km² scenario results, Area D:

Year	Area (Km ²)	Mean Density (mean total ping /Km ²)	% of annual Intensity	Total pings/km ²
2007	120.25	51.03	4.86	6136.38
2008	120.00	66.62	5.42	7994.03
2009	119.50	52.50	3.65	6274.21
2010	120.00	63.41	5.08	7609.20
2011	120.75	80.04	5.30	9665.16

The total pings/km2 and annual % of total VMS intensity are illustrated in figures 9 and 10.

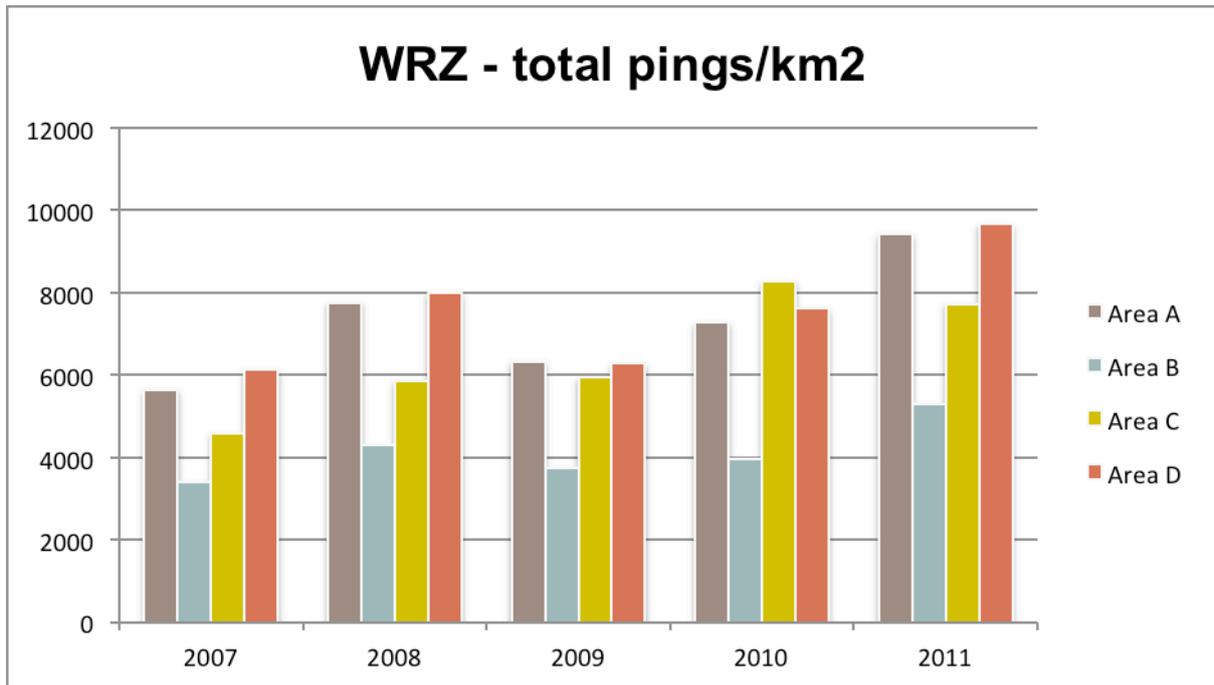


Figure 9 total sum of pings/km2 in each area per year (2007-2011)

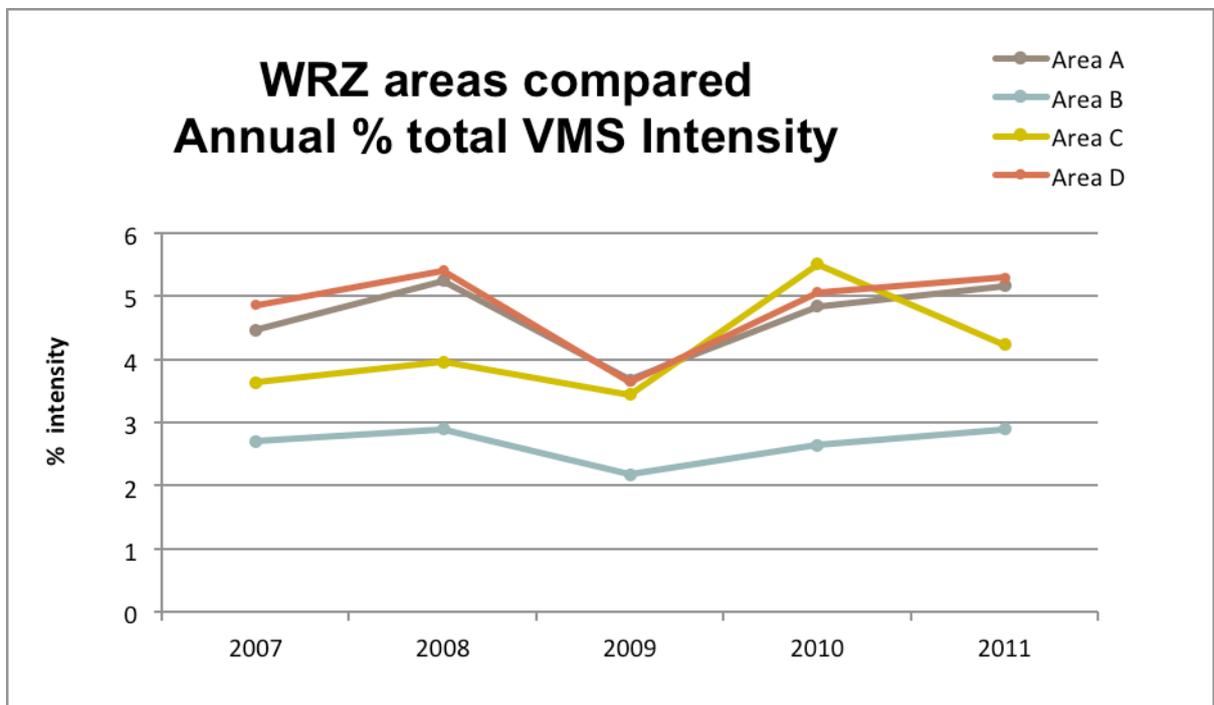


Figure 10 % of total annual fishing intensity within each area per year (2007-2011)

% of VMS grids in each area:

The % reflects amount of each area that has fishing activity – 100% means the entire area (120km²) has some amount of fishing activity (at 0.25km² grid resolution).

Area\ Year	2007	2008	2009	2010	2011
Area A	100	100	99	100	100
Area B	91	97	97	89	93
Area C	99	97	99	98	99
Area D	100	100	100	100	100

The *Area B* scenario has the least amount of fishing activity and, as illustrated in figure 10, the area with the least intense fishing activity for boats over 15 metres.

SECTION 2 CONCLUSIONS

This report has focussed on the utility of VMS data for assessing fishing effort and certain assumptions have been made with regard to the processing. Although recommendations have been made recently for the adoption of a vessel monitoring system for the <10m fleet no decision has yet been made on this.

http://www.afbini.gov.uk/sustainable_development_strategy_for_ni_inshore_fisheries_fin_.pdf.

Trial developments have proven useful but without universal adoption have limited value. Consequently further work is required to quantify scallop dredging and potting effort.

It is anticipated that the forthcoming FishRAMP project will provided an assessment of the potential economic and environmental consequences arising from displacement of fishing activity due offshore development and other regulatory developments.



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