THE EFFECTS OF OFFSHORE WIND FARMS ON FISHING ACTIVITY AND LANDINGS

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Introduction

•Marine renewable energy development and the designation of marine protected areas will inevitably restrict space available for fishing and other activities.

•The co-location of offshore wind farms (OWFs) with marine protected areas (MPAs) may provide a means of limiting the total area closed to fishing activities while augmenting stocks of commercial species.

•Alternatively OWFs may provide new fishing opportunities to mitigate for area closures through MPAs and disruption to fishing activity during construction activities for OWFs.

•The aim of the study was to examine whether fishing activity and landings increased or decreased in proximity to operating OWFs compared to pre construction conditions.

•Fishermen were also interviewed to gather their perceptions on the effects of OWFs on fishing activity and catches and the best planning solutions to support the co-existence of both industries alongside marine conservation measures.

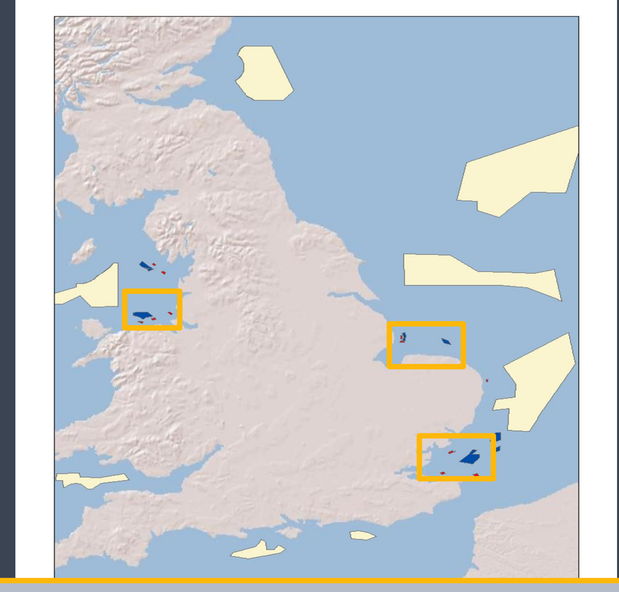

Fig 1. The three study sites (contained in yellow boxes)

Methods

•Three OWF development areas were selected in English and Welsh seas. These were Liverpool Bay in the Eastern Irish Sea, the Greater Wash and the Greater Thames regions, both in the North Sea (Fig 1).

•Fishing activity data were collated for **static** fishing practices (such as potting and static nets) and **mobile** fishing practices (trawling and dredging). Landings data were provided by MMO for relevant ICES rectangles covering each region.

•Fishing activity data were mapped in a geographical information system. Annual fishing effort was analysed within three separate distance categories from OWFs and compared between pre OWF construction and post OWF construction periods (over 5 year periods pre and 5 year post construction where data available) (Fig 2).

•Two forms of statutory data, vessel monitoring system (VMS) data (aggregated for one year) and aerial surveillance data were accessed for the three development regions through the Marine Management Organisation (MMO). Fishermen also mapped the grounds used and intensity before and after OWF construction during interviews.

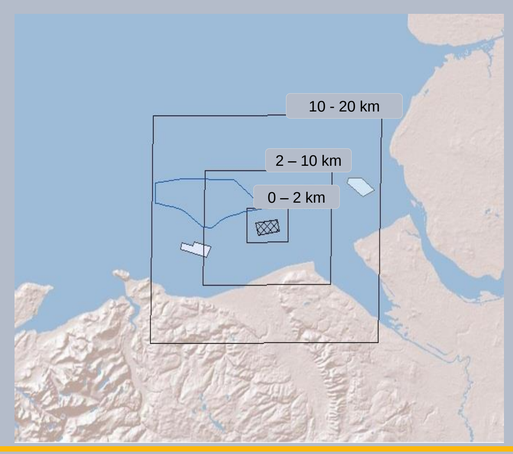

Fig 2. Example from Liverpool Bay of distance categories within which data were compared for pre and post construction periods (North Hoyle OWF is the cross hatched box)

		Liverpool Bay			Greater Wash			Greater Thames		
		VMS	Aerial	Interview	VMS	Aerial	Interview	VMS	Aerial	Interview
NEAR (a)	Mobile		↓	↓*	↓	↓	↓		↔	↓
	Static		↓	↓		↑	↓		↑*	
MID (b)	Mobile	↓	↓	↓*	↓	↓	↑	↓	↑*	↓
	Static		↓	↓		↑*	↑		↑*	
FAR (c)	Mobile	↓	↓	↓	↓	↔	↑	↓	↑*	↓
	Static		↑	↔		↓	↑		↑*	

Table 1. Change in fishing effort for static and mobile fishing practices post OWF construction in each of the study regions within each of the distance categories (0 – 2km (a), 10 - 20km (b), 20 - 30km (c)). Increased activity (↑), no change (< >) , decreased activity (↓) statistically significant changes are indicated by *, blank cells indicate no data were available.

Results

•**Mobile fishing activity** data showed decreases in fishing intensity in proximity to OWFs in all data sets at all study sites (Table 1).

•**Static fishing activity** also showed a general decrease in fishing intensity in proximity to OWFs from interview mapping data, although aerial surveillance data recorded increased sightings of vessels in proximity to OWF sites post construction at two study sites (increases of only 1 – 2 sightings per year)(Table 1).

•**Landings in relevant ICES rectangles** of mixed demersal fish, flatfish species, shellfish species and elasmobranch species all decreased in the years following construction of OWFs in each study region.

•**Interviews conducted with 37 fishermen** (18 using mobile gear, 19 using static gear) across the 3 study sites revealed loss of ground as the greatest effect on activity. Potential for increase in abundance of crab and lobster was suggested by 5 fishermen although decreases in catches of rays and flatfish were reported by 20 fishermen.

•**Suggested solutions** to aid co-existence of industries and forthcoming marine protected areas included:
- Improved consultation between fishing and renewables industries from an earlier stage in the planning processes (11 fishermen).
- Co-location of OWFs and MPAs (10 fishermen).
- Addressing negative effects of piling and possible electric and magnetic fields (7 fishermen).
- Increasing habitat potential of scour protection through use of artificial reef designs (6 fishermen).

Discussion and conclusions

•Confidence in results from analyses of fisheries surveillance data was limited by the level of data provided for research due to commercial sensitivity restrictions and the suitability of surveillance data to quantify actual fishing activity and catches.

•The trends in activity and catches were also influenced by fisheries regulatory changes such as licenses and quotas and at a local scale by pressures from existing activities such as oil, gas and aggregate industries as well as conflict with visiting fishing fleets.

•The level of impact from the effects of OWF development on fisheries is also related to the type of fishing practices present in each region, causing each region to require different mitigation solutions.

•As OWF development expands effort displacement over greater spatial scales is likely to cause greater environmental, social and economic challenges.

•This study has informed a series of NERC knowledge exchange workshops addressing mitigation solutions for the renewable energy and fishing industries, links to this work are available on the NERC KE website, https://ke.services.nerc.ac.uk/Marine

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