



Recreational use of offshore wind farms: Experiences and opinions of sea anglers in the UK



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ABSTRACT

The expansion of offshore wind farms (OWFs) is likely to increase conflict with other marine users as different sectors compete for space. There may also be positive interactions, as the artificial reef effects from energy infrastructure have the potential to sustain and enhance fishing opportunities. Recreational sea angling is an important sector within the UK but the experiences and opinions of UK sea anglers with respect to OWFs have not been documented. To address this, an online survey was undertaken with recreational anglers around the UK (n=199). Respondents represented a range of socio-demographic and angling characteristics, although male, more frequent and older fishers as well as club members were over-represented compared to a 2012 national survey. One quarter of the respondents had fished around the perimeter of or within an OWF, most on multiple occasions, and 73% of those who had not expressed a willingness to do so in future. Anglers reported both positive and negative effects on catch success when fishing near or within OWFs compared to their experiences of the same site prior to OWF development. Outcomes for individual species were also mixed. Anglers recognised the potential artificial reef effects of OWFs and their role as a “safe haven”, particularly due to the exclusion of commercial fishers. Negative perceptions included restricted access, harm to marine wildlife, and visual impact. There is little evidence that OWFs will have a significant economic impact on recreational fishing, as most anglers are unlikely to change their behaviour in response to future developments.

1. Introduction

By the end of 2015, more than 12 GW of offshore wind capacity had been installed globally, of which 3.4 GW was installed during 2015 alone [1]. Over 80% of this capacity is located off the coasts of five countries in northern Europe: the UK and Germany are world leaders with, respectively, 1454 and 792 offshore wind turbines connected to the grid [1]. Growth of the sector is expected to continue at a similar pace. The UK, for example, has an additional 547 turbines in projects at the pre-construction or construction phase [2]. The further expansion of offshore wind farms (OWFs) in the coastal waters of Northern Europe is likely to increase conflict with other marine users as different sectors compete for space. Understanding the interactions between marine activities is a key component of the marine planning process, the application of which is increasing globally. The future growth of marine energy has already been highlighted as an important factor within the UK's marine planning process [3].

Interactions between other marine users and OWFs may not necessarily be negative. In particular, sessile benthic organisms will settle on the hard substrate provided by OWF infrastructure (including

foundations, cables and their armouring), creating artificial reefs. The refuge and food source provided by these artificial reefs attracts species of importance to commercial and recreational fishing, and so has the potential to support fishing activities [4]. This has been shown to be the case for oil and gas infrastructure in the Gulf of Mexico, where the platforms are regularly utilised by anglers and commercial fishers [5–7].

Evaluation of the impacts of OWFs on fisheries, and the opportunities for co-location of the sectors, has focussed on commercial activity, primarily using workshops and surveys to determine fishers' perceptions of the potential impacts on their industry. This has shown that commercial fishers recognise possible opportunities from OWF developments in terms of alternative employment, creation of marine habitats and improvements in harbour infrastructure, whilst also fearing loss of fishing grounds and income, and holding negative views on the form and content of the consultation process e.g. [8–11]. Empirical evidence of the extent of the displacement of trawling activities from OWF footprints is also beginning to emerge [12].

There were over 12,000 fishermen employed within the UK's commercial fleet in 2015, and the Gross Value Added from the sector

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was £604 million [13]. However, recreational sea anglers are also an important group of marine users: there are an estimated 884,000 sea anglers in the UK, who contribute approximately £2.1 billion to the economy [14]. The need to understand how the growth in marine energy will affect recreational users of marine space has been identified [3], but there has been no detailed assessment of the implications of OWFs for recreational sea angling in the UK. OWFs in England have been perceived as a potential opportunity for sea anglers, who could profit from the exclusion of commercial fishers from the sites and a possible increase in fish abundance [10]. Conversely, a scenario for Scotland has been postulated in which all sea angling within OWF footprints ceases and is not offset by increased activity elsewhere, resulting in a cost to the sector of £24.5 million [15]. However, neither study included significant engagement with the recreational angling community: only one angling network [15], and three individuals [10] were consulted. The resulting uncertainty in the evidence used to support the assumptions on which future scenarios were based has been explicitly noted [15].

This paper seeks to address this gap in the existing evidence by providing primary data on the experiences and opinions of sea anglers with respect to OWF development in the UK, and hence provide information relevant to OWF development, marine planning and the sustainable use of marine space.

2. Method

An online questionnaire was developed with four sections, the first of which concerned respondents' current angling activities including frequency, location, and target species, while the second section comprised questions on experiences of angling within OWFs. The third section contained a set of questions intended to solicit more general opinions of OWFs such as their wider environmental impacts and role in the energy mix, usually via a series of statements to which respondents could express their level of (dis)agreement on a five point Likert scale (with additional "no opinion" and "don't know" response options). Standard background information on gender, age, education, employment and income was also collected in the final section. Open-ended questions were included in different sections of the survey to allow respondents to expand on previous responses or provide additional information.

The questionnaire included two additional sections for respondents who had previously been sea angling along the south coast of England between Beachy Head and Selsey Bill. This region incorporates the site of the Rampion OWF, which, at the time the survey was implemented, had not yet entered the offshore construction phase. The purpose of these sections was to assess whether sea angling activities would be affected by the OWF development and to consider the economic implications of any changes. The assessment included two contingent behaviour scenarios of i) increased catches and ii) no change in catches as a result of the OWF development. Each respondent completing that section of the questionnaire was randomly allocated only one of the two scenarios. Respondents were asked to report whether the number of trips they would make to the area following OWF construction would increase, decrease or remain the same under the conditions described within the scenario.

The questionnaire was tested face-to-face with sea anglers in Plymouth, before being implemented online between November 2015 and January 2016 with recreational sea anglers around the UK. Web links to the survey were advertised by sea angling clubs (which had been identified through national federations and online searches), angling magazines, and on social media. Participants were also recruited via the angling representatives of Inshore Fisheries and Conservation Authorities (IFCAs; statutory agencies with responsibilities for inshore fisheries and the marine environment), who circulated the web links to their key contacts and angling forums, in newsletters and on their websites. Initial invitations to participate were followed-

Table 1
Percentage of respondents with particular demographic characteristics, comparing this study to the 2012 UK national angling survey [14].

| | This study | 2012 UK national angling survey [14] | |
|-------------------------------|------------|--------------------------------------|----|
| Employed | 73 | | – |
| Retired | 23 | | – |
| Household income > £40,000 pa | 53 | | – |
| Angling club member | 67 | | 7 |
| Male | 98 | | 84 |
| Age | | | |
| 18–24yrs | 5 | 16–25yrs | 11 |
| 25–44yrs | 24 | 26–45yrs | 39 |
| 45–64yrs | 51 | 46–65yrs | 41 |
| > 64yrs | 21 | > 65yrs | 9 |
| Frequency of fishing activity | | | |
| Most days | 3 | | |
| 1–3 times per week | 25 | Frequent (9+ days in last 3mths) | 12 |
| 2–3 times per month | 44 | Regular (4–8 days in last 3mths) | 24 |
| Once per month | 13 | Occasional (2–3 days in last 3 mths) | 32 |
| Less than once per month | 13 | Rare (1 day in last 3 mths) | 32 |
| Less than once per year | 3 | | |

up with two reminders at approximately monthly intervals.

3. Results

3.1. Demographic and sea angling characteristics

The survey generated 199 usable responses. The sample included individuals with a range of backgrounds and angling practices (Table 1), although male, more frequent and older anglers were over-represented in comparison to a 2012 national angling survey [14], which provides the most comprehensive national dataset on the demographics of UK sea anglers. The sample of respondents in our survey also contained a higher proportion of anglers who are members of angling clubs, a consequence of the sampling procedure that used clubs as one point of contact to recruit survey participants. Responses were received from around the coast of England and Wales with some representation from Scotland, although most respondents were from southern (and particularly south eastern) England (Fig. 1).

OWFs are located some distance from shore and hence are most likely to affect those fishing from boats rather than shore-based anglers. Sixty one percent of respondents reported that they usually fish from boats, of whom almost 40% fish within the South and Sussex IFCA areas (Fig. 1). None of the respondents from Northumberland or Scotland were regular boat users. While the opinions of boat-based anglers in these regions is therefore under-represented, as yet the only major OWF in Scotland is Robin Rigg, which is located in the Solway Firth on the border with England.

The reported distance travelled by those who fish from boats during normal angling activities was, on average, 10 nautical miles offshore. Seventy five percent of existing OWFs are within 10 nm of the coast [2], suggesting that distance from shore is not a significant barrier, in principle, to anglers accessing OWFs. Willingness to fish near natural and artificial reefs may also have a bearing on the likelihood of anglers using OWFs as fishing sites, as it serves to indicate whether they value reefs as angling locations and also their perception of the risk of approaching these structures. Over 80% of the respondents reported that they fished at least sometimes near reefs or artificial structures such as wrecks, while 47% and 39% of respondents fished "most of the time" or "always" near reefs and artificial structures respectively.

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