



Anglers' support for an offshore wind farm: Fishing effects or clean energy symbolism

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ARTICLE INFO

Keywords:

Recreational Angling
Offshore wind energy
Mixed methods
Public acceptance
Ocean governance

ABSTRACT

Rapid expansion of offshore wind energy will have impacts on existing users of marine space, including recreational angling. Because angling has significant economic and cultural significance in ocean and coastal areas, and managers increasingly employ new approaches to manage conflicts between fishing and other uses, it is critical to understand the perspectives of this interest group regarding development of offshore wind energy. Using a mixed-methods approach, this study examines the attitudes of anglers towards the Block Island Wind Farm, the first offshore wind energy development constructed in the United States. Supported by qualitative interviews, a quantitative survey of 199 anglers from Rhode Island, Connecticut, New York, and Massachusetts reveals moderate support for the wind farm. Experience fishing at the wind farm is associated with more positive beliefs regarding the development's effects on catch-related aspects of fishing; however, beliefs about catch-related effects are not as strong predictors of support as non-catch factors (specifically, visual impacts). Moreover, belief that the wind farm is "symbolic of progress towards clean energy" has the greatest total impact on support and effects of the wind farm, indicating that underlying values and ideologies may have greater influence on angler's attitudes towards offshore wind projects than effects on the fishing experience. Greater research is needed to understand how general characteristics of anglers affect their attitudes towards offshore renewable energy and other marine governance decisions. Managers must also facilitate greater participation of anglers in offshore wind energy decision-making.

1. Introduction

Offshore wind energy is a critical component of a broader transition to renewable energy in many countries, providing for current and future electricity needs in a less carbon-intensive manner. Over the past two decades, wind turbines operating in marine environments have become a significant source of electricity in Northern Europe and China. In 2021, offshore wind farms comprised more than 55 gigawatts of electricity generation capacity worldwide [1]. The United States (U.S.) has installed just 42 megawatts (MW) of offshore wind energy capacity to date, but the federal government has leased nearly two dozen areas of the Outer Continental Shelf for wind energy development and set a goal of 30 gigawatts by 2030. This expansion of offshore energy technologies, however, has implications for fishing, a longstanding commercial, cultural, and recreational activity in these ocean and coastal spaces [2,3]. Although there is an extensive literature on the social acceptance of

renewable energy technologies, including offshore wind energy, little research has assessed the attitudes of recreational fishers. Because fishing is a dominant use of marine space, a fuller understanding of social acceptance of offshore wind energy requires a greater examination of how fishing communities are thinking about the technology. This understanding can, in turn, inform managers' efforts to mitigate potential conflicts between offshore wind and fishing through approaches such as marine spatial planning [4,5] or multi-use [6,7].

Much of the attention on fisheries and offshore renewable energy development has focused on commercial fishing [8,9]; yet, recreational angling is a critical economic and cultural use of marine waters and is also affected by offshore wind. Because offshore wind turbines create structure on the seafloor, they are widely considered to function as artificial reefs and thus provide benefits to anglers. Limited research on anglers' perceptions and experiences with offshore wind energy [10,11] reveal that anglers largely agree with the characterization that turbines

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<https://doi.org/10.1016/j.marpol.2023.105568>

Received 9 August 2022; Received in revised form 17 January 2023; Accepted 9 March 2023

Available online 16 March 2023

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create fish habitat. Yet, the catch itself is only part of the fishing experience. Anglers' opinions regarding non-catch aspects of offshore wind energy have been more mixed. To date, there is little data demonstrating how perceptions of impacts to either catch or non-catch aspects of recreational fishing affect anglers' acceptance of offshore wind energy.

In a mixed-methods study, we used surveys and interviews to explore the perceptions and attitudes of recreational anglers in Southern New England, U.S., towards the first offshore wind farm developed in the U.S., the Block Island Wind Farm. Based on anglers' responses to other artificial reef habitats, we anticipated that anglers in our study would have a positive assessment of the Block Island Wind Farm, particularly if they had fished at or near the turbines. Smythe et al. [10] report study findings regarding how the wind farm has affected anglers' experiences fishing in the area. Findings suggest that anglers were optimistic regarding the effects of the wind farm on catch, but they were less enthusiastic about the wind farm's effects on non-catch aspects of the angling experience (boat traffic, visual effects). Here, we focus on whether anglers' beliefs about the wind farm influence support for the project. In this paper we first examine factors that influence community acceptance of offshore wind energy development, with saltwater anglers comprising the community of interest. The next section introduces the study site and its importance to recreational fishing. Then, we present data collected from saltwater anglers who have fished either within close proximity of the Block Island Wind Farm or within the region, shedding light on how catch, non-catch, and other factors shed light upon acceptance within the recreational angling community. We then present our study methods and results, focused primarily on quantitative data, with support from qualitative findings. Finally, we discuss the implications of this study for the co-location of offshore wind energy and recreational angling, as well as the processes used to develop energy projects offshore. While our data confirms that fishing at the turbines is associated with greater support of the project, we found that other factors, including the visual impact and "green" symbolism of the turbines, have a greater overall impact on anglers' attitudes.

1.1. Community acceptance of offshore wind energy

Scholars and practitioners widely believe that social acceptance is critical to the widespread deployment of renewable energy technologies, spawning a growing literature on public attitudes and preferences. Social acceptance scholarship arose in response to concerns over opposition to energy infrastructure projects; however, research on social acceptance now seeks to understand the diverse favorable and unfavorable responses to energy technologies, encompassing wide-ranging disciplines and critical perspectives [12–15]. A frequently cited work characterizes social acceptance as occurring along three pathways: market acceptance, socio-political acceptance, and community acceptance [16]. This framework has been criticized as not adequately capturing the nuance of social responses and interplay among different actors, focusing too heavily on opposition, and for insufficiently examining the term "acceptance" [13,17,18].

Batel and colleagues [18] have addressed the problematic nature of the terms "support" and "acceptance." They conclude that "acceptance" implies a degree of acquiescence, particularly to something imposed from above, while, "support" connotes a degree of agency, in which a person is endorsing a particular item or concept. Acceptance can also encompass general attitudinal responses towards a technology [14,19]. In this article, we are focused on the experiences and beliefs of a community of interest, recreational anglers, towards a specific offshore wind energy project, the Block Island Wind Farm, and how those experiences and beliefs affect their attitudes towards the project.

Research in Europe and the U.S. has revealed several factors that influence community acceptance of renewable energy projects, including offshore wind energy [20–24]. These include underlying values of the public, anticipated impacts to natural features and socio-economics, and perceived procedural and distributive fairness. A major

emphasis of community acceptance studies has been the visual impacts of offshore wind energy, with a common finding that the public prefers wind turbines to be sited further offshore, at least to a point [25,26]. Visual preferences are also related to the "fit" of turbines on the seascape and effects on valued places, to which the public may ascribe various meanings [27–29]. Firestone et al. [30] also found that the symbolic value of offshore turbines as "progress towards green energy" was an important factor driving greater public acceptance. Literature on offshore wind energy's effects on tourism and recreation are mixed, with studies revealing both potential positive and negative effects [31–33].

1.2. Recreational angling and offshore wind

Discussions of fisheries and offshore wind have primarily focused on commercial fishing [11]. The tensions between commercial fisheries and the offshore wind industry have been well documented [2,8,34], with opposition to the technology within the commercial fishing industry ascribed to concerns over restricted access to wind energy areas, interference with fishing practices (e.g., mobile gear), potential ecological impacts, and the anticipated economic losses stemming from these impacts [6,35,36].

Despite its economic and cultural importance, fisheries management and research have often neglected recreational fishing [37], which includes the consideration of interactions with offshore wind energy. There is a widespread belief that turbine foundations act as artificial reefs by providing hard structure that encourages colonization of invertebrates (such as mussels), providing food and shelter that aggregates fish [35]. Although few publications provide evidence that offshore wind turbines benefit fish populations, a recent analysis by Mavraki et al. [38] suggests that some species will use wind farm sites as a primary feeding area, while others are less dependent on these artificial reef environments. Due to their reputation as an artificial reef, the turbines become a desired destination for recreational angling. At the Block Island Wind Farm in the U.S., recreational anglers have expressed enthusiasm regarding the availability and diversity of fish at the turbines and perceive positive effects of the turbine structures on catch [10,34,39]. An online questionnaire in the United Kingdom [11] revealed that anglers generally support the portrayal of offshore wind farms as artificial reefs; however, anglers' experiences of fishing at or near wind energy developments were more mixed. Although most respondents to the survey (57%) believed catches had not changed or had improved at turbine sites, others reported a decline in catches.

Fish landings, however, are only part of the experience sought by recreational anglers [40] – there are several non-catch variables affecting angler satisfaction. Among these, anglers are strongly averse to crowding in areas where they fish, and to a lesser extent, aesthetics of the fishing environment also affect the angling experience [41]. Anglers have expressed concern over the congestion of anglers at offshore turbines [11], including at the Block Island Wind Farm [10,34]. Although Hooper et al. [11] found anglers were critical of the effects of turbines on the viewshed in the UK, anglers and other boaters who visited the Block Island Wind Farm were largely positive or neutral about the turbines' appearance [39].

Despite the developing literature on anglers' experiences and perspectives on turbines in marine spaces, little research has sought to understand anglers' acceptance of offshore wind energy projects. Anecdotal evidence, such as the website for the U.S.-based initiative, Anglers for Offshore Wind (anglersforoffshorewind.org), suggests that active support for the technology might be possible; yet, little empirical evidence has been published to demonstrate acceptance of anglers or to offer explanatory variables of their attitudes. In their online survey with

a convenience sample of anglers, Hooper et al. [11] found that only 27% agreed that they would strongly oppose the development of offshore wind energy near where they go angling. Roughly half of the sample disagreed that they would strongly oppose offshore wind energy development,¹ which implies some level of acquiescence; however, this is not a clear indicator of acceptance. Hooper et. al further note that, beyond perceived effects of wind energy developments on catch- and non-catch related factors, anglers likely also share opinions of the general public. In other words, anglers' levels of acceptance for offshore wind energy may be related to factors that are not directly related to fishing.

2. Study site

Construction of the Block Island Wind Farm, the first commercial offshore wind energy development in the U.S., was completed in 2016. Comprising five 6-MW turbines, it sits in the Block Island Sound, approximately 5 km (3 miles) off the southeast coast of Block Island and 30 km (16 miles) off the mainland coast of the state of Rhode Island. Electricity produced by the 30-MW capacity development flows to the island via undersea cables buried in the sediment; energy not consumed on the island is integrated into the mainland power grid via a second undersea cable. The turbines are sited within a Renewable Energy Zone that was defined through a two-year, state-led multiparty marine spatial planning effort, known as the Ocean Special Area Management Plan (Ocean SAMP) [see 41]. Public acceptance of this wind energy development has been well-studied [23,29,30], as has its effects on the tourism and recreation experience [39,43–45].

Tourism and recreation are major contributors to the Rhode Island economy, and Block Island is a well-known regional tourist destination. Recreational saltwater fishing is an attraction of the state; in 2019, more than 3.7 million recreational angling trips and associated expenditures contributed nearly \$83 million USD to the state of Rhode Island's economy (NOAA 2022). Extensive pre-development angling activities, as well as their economic, historical, and cultural significance, were documented in the Ocean SAMP (CRMC 2010). Recreational fishing is a popular activity on Block Island, with anglers operating from shore, private boats, and for-hire charter and party boats. Other anglers using the area south of Block Island depart by private or for-hire boats from the mainland, including many trips from nearby states (Massachusetts, Connecticut, and New York's Long Island). The area hosts several annual fishing competitions, with targeted species such as striped bass (*Morone saxatilis*) and summer flounder (*Paralichthys dentatus*).

3. Methods

This article reports findings from a mixed-methods study of anglers' experience with the Block Island Wind Farm. Data was collected through an online survey and qualitative interviews with recreational saltwater anglers fishing in waters off the coast of Rhode Island. A further discussion of methods and additional findings are presented in Smythe et al. [10].

In spring 2019, a random sample of 2500 anglers was selected from Rhode Island entries in the National Saltwater Angler Registry.² Any

¹ The Hooper et al. (2017) items gauging acceptance asked respondents to agree or disagree (on a 5-point scale) with the statement, "I would strongly oppose an offshore wind farm built near where I go angling."

² The National Saltwater Angler Registry is maintained by the U.S. National Marine Fisheries Service to support fishery management. Anglers must hold Rhode Island permits to fish in Rhode Island waters even if they live in another state. As registry data do not specify where, how (e.g. from land or by boat), or how often anglers fish, surveys were sent to a random sample and thus likely included anglers unfamiliar with or unable or unwilling to fish offshore near the Block Island Wind Farm.

individual who purchases a saltwater recreational fishing license in the state is automatically registered in this national database. Using addresses associated with individual fishing licenses, invitations to participate in an online survey were mailed to households in New York, Connecticut, Rhode Island, and Massachusetts. Participants entered a unique code, provided in the invitation letter, to access the online survey. Using a tailored design method [46], anglers in the sample were sent two reminder postcards and three \$50 Amazon gift cards were raffled to increase response rate.

The survey consisted of close-ended questions focused on individual saltwater fishing activities in the Northeast, fishing near or within view of the Block Island Wind Farm, and attitudes towards offshore wind energy and the Block Island Wind Farm. Questions were developed from common survey measures found in the literature and informed by themes gleaned from semi-structured interviews with recreational anglers in the Northeast region (discussed below). Specific measures are discussed in the Findings section. Data was analyzed using IBM SPSS and AMOS statistical software.

Two waves of semi-structured interviews were conducted with key recreational angling contacts, including individuals from each of the four states in the project area, before and after administration of the survey. Interview participants were identified through a combination of purposive and snowball sampling. The team identified recreational fishing sectors of interest (private angling, charter boats, spearfishing, marinas, and tackle shops) and then contacted publicly known representatives of a well-known state fishing organization for a list of potential participants encompassing all sectors and all four states. Further names were identified through initial interviews until all sectors and states were represented. The first wave of interviews, conducted in 2018, included a total of 19 participants (53% response rate). The second wave, conducted in 2019, reached twelve of the original interviews (63% response rate). Interviews explored interviewees' fishing background, wind farm fishing experience, and thoughts about future offshore wind energy development, whereas follow-up interviews explored the same topics through questions about changes that had taken place during the interceding year. Interviews, which lasted from 21 to 70 min, were recorded, transcribed, and coded using NVivo qualitative data analysis software. Coding followed the thematic analysis approach outlined in Braun and Clarke [47,48]. Following this approach, two coders coded transcripts inductively, allowing initial codes and themes to emerge from the data. The two coders and the third team member then conducted a thematic mapping exercise to define final overarching themes.

4. Results

This article focuses primarily on results from the online survey. However, results from the interviews are included where appropriate to elucidate and support conclusions from the quantitative data (for an in-depth discussion of interview findings see Smythe et al. [10]).

After removing addresses to which invitations could not be delivered, the total sample for this survey was 2217 saltwater anglers. With 199 completed surveys, the response rate was 8.9% (see Fig. 1). Declining response rates are an issue recognized in natural resources-related social science [49], with participation being affected by salience of the topic [50]. Non-response in this survey might be explained, in part, due to self-selection by anglers with knowledge of or experience with the Block Island Wind Farm; as stated above, the range of anglers included in the sample spanned four states, and the database from which the sample was drawn does not provide details on where or how (e.g. by land or by boat) anglers fish. Although the survey has a low response rate, the validity of these quantitative results is reinforced by the insights from the interviews.

4.1. Sample characteristics

A plurality of respondents (42.9%) were residents of Rhode Island, followed by New York (23.5), Connecticut (21.4), and Massachusetts (10.2) (Table 1). Basic demographic characteristics (gender, age, education level, household income, and political orientation) were collected as part of the survey. Survey respondents were primarily male, older than the general population, and relatively well educated. Respondents identified as 81.4% male and 13.6% female. Reported ages ranged from 20 to 88 years old, with an average age of 53.5 (SD14.30). For reported education level, 56.8% of respondents had a bachelor's degree or higher. Respondents were asked to categorize their household income in one of seven categories ranging from less than \$25,000 to \$200,000 or more; overall, there was a broad distribution of household income with 38% greater than \$100,000. When compared to a national sample of salt-water anglers in the same timeframe [51], our sample was slightly more male, comparable in terms of age and income, and had attained a higher level of education. For political orientation, 31.1% of respondents identified as conservative or very conservative, 21.6% of respondents identified as liberal or very liberal, and 43.2% identified as neutral.

Most of the respondents (97.5%) reported fishing with rod and reel, while 13% fly fish, and 8.5% report spearfishing. Participants were asked how often they fished on a private boat, for-hire boat, and from shore on a 5-point scale ranging from never to daily. The average frequency of fishing was less than once per month; however, nearly 22% of respondents fish from the shore and nearly 25% fish from a boat at least weekly. Respondents reported fishing primarily from private boats, with nearly 43% owning a boat from which they fish, and 55% never fishing from a for-hire (charter or party) boat. Respondents target many fish species. The most common targeted species were striped bass (*Morone saxatilis*; 80.4%), summer flounder/fluke (*Paralichthys dentatus*; 66.3%), bluefish (*Pomatomus saltatrix*; 63.8%), black sea bass (*Centropristis striata*; 56.3%), tautog/blackfish (*Tautoga onitis*; 49.2%), and scup/porgy (*Stenotomus chrysops*; 43.7%).

Overall, respondents were experienced anglers. While years of fishing experience ranged from 1 to 70 years, the average was 28.4 (SD 18.79) years. Based on findings that experience and importance of fishing in the lives of anglers relate to differences in attitudes, six survey items drawn from Sutton and Ditton [52] asked respondents to indicate the role of fishing in their lives (e.g., "I find a lot of my life is organized around fishing"). These items were averaged together (Cronbach $\alpha = 0.869$) to form a single measure of *centrality to lifestyle*. The mean centrality to lifestyle rating among participants was 2.79 (SD.866) on a 5-point scale.

Respondents had substantial experience with the Block Island Wind Farm project, with 63.8% of respondents reporting having fished within view of the Block Island Wind Farm during the past 12 months. More than a quarter of respondents (28.6%) reported having fished at the wind farm during the past year, indicating, perhaps, a strong self-selection bias in survey participants. Fishing at the wind farm was defined as "fishing near (within 100 yards) or between the turbines, where you must navigate around the turbine foundations." Fishing played a more central role in the lives of respondents who fished at the wind farm than those who did not (centrality to lifestyle ratings of 3.04 vs. 2.69; $p = .01$).

Table 1
Distribution of survey respondents by state.

State	Respondents	Percentage
MA	20	10.2
RI	84	42.9
CT	42	21.4
NY	46	23.5
Other/Missing	7	3.5
Total:	199	100%

4.2. Attitudes towards the Block Island Wind Farm

This study included four categories of variables regarding respondents' attitudes towards the Block Island Wind Farm: support for the wind farm, perceived effects of the wind farm on fishing, visual impacts, and symbolic meaning of the wind farm. Overall, respondents moderately supported the wind farm. On a 5-point scale of support for the Block Island Wind Farm (strongly oppose to strongly support), respondents averaged 3.66 (SD 1.10). This variable is the primary dependent variable in this analysis. Although the item uses the terms "support" and "oppose," this does not imply active support or opposition to the project (such as speaking at a hearing or writing a letter to a newspaper). Rather, it captures a general attitude towards the project, consistent with the concept of acceptance as a response to an external stimulus [18]. Overall, interviews reflected qualified support of the wind energy development within the angling community, with support hinging on continued access and concerns about crowding on the water.

Adapted from a scale developed by Brinson and Wallmo [53], respondents were also asked to indicate on a five-point scale (very negative to very positive) how the Block Island Wind Farm has affected aspects of recreational angling. Six items (fishing experience, enjoyment of fishing, availability of trophy fish, number of fish, diversity of fish, and structure/habitat) were combined into a single latent variable, *fishing effects*, with a mean rating of 3.19 (SD.598) and strong reliability ($\alpha = 0.914$). This mean rating indicates a perception among respondents that the wind farm has had a small, net-positive impact on catch. Ratings for fishing effects were significantly higher ($p = .001$) for respondents who had fished at the wind farm (3.43) compared to those who had not (3.07). Interview results confirm that anglers who fish at the wind farm believe that the hard structure of the wind turbine foundations has caused fish to aggregate at the site, resulting in more successful catches, greater diversity of fish species, and greater availability of "trophy fish."

When asked directly, 50.3% of respondents reported they like the way the turbines look, with only 21.6% reporting that they do not like the way they look. However, five other survey items elucidate more detailed opinions regarding visual impacts. Based on questions developed by Firestone et al. (2018), respondents were asked their level of agreement with descriptions of the wind farm on a five-point scale (strongly disagree to strongly agree). Respondents reported slight disagreement that the wind farm "fits well within the landscape" (2.87; SD 1.00) and that "the turbines are enjoyable to look at" (2.91; SD 1.06). Following Bidwell [23,54], respondents were also asked to rate effects of the wind farm on a 5-point scale (strongly negative to strongly positive). According to these measures, respondents believe on average that the wind farm has negative effects on "scenic views" (2.61; SD.967), "natural beauty" (2.59; SD.962), and "ocean character" (2.58; SD.877). These five items can be combined into a single latent variable, *visual effects*, with high reliability ($\alpha = 0.898$) and a mean of 2.71 (SD.808). Sitting below the midpoint of the combined scales, this result points to a slightly negative response to the visual aspects of the wind energy project among survey respondents.

The complexity of responses to the visual effects of the wind turbine development are elucidated by the interviews, which provided somewhat more positive responses to the turbines. Many of the interviewees offered impressions of the turbines based on their size, describing them as "massive," "impressive," and "dramatic." While a minority of interviewees did not like the appearance of the turbines, most of the interviewees described the turbines in a positive light, using phrases such as "pretty cool" or "beautiful." Among the more detailed descriptions, one interviewee stated: ".That's where the romance is, because they look so majestic. They're so elegant, you know, just towering over the water with their huge blades. It's very captivating for me and for anyone who sees them." The difference in response to visual effects between survey and interview respondents may be explained by differences in the two samples; interviewees were primarily specialized anglers who fish regularly at the wind farm (for further discussion see Smythe et al. [10]).

In terms of symbolic meanings of the wind farm, respondents responded to two items drawn from Firestone et al. [30]. Related to visual impacts, there was slight agreement on a five-point scale (3.13) that the wind farm “causes the loss of something intangible, where all you see is the ocean.” Anglers in this study reported stronger agreement (3.85) that the wind farm is “symbolic of progress towards clean energy.” Although not a dominant theme in the interviews, there were also interviewees who discussed the value of the wind turbines as a symbol of environmental progress: “You know, being someone who is environmentally conscious, I think that makes me feel good and proud.” Expanding on this theme, another interviewee offered that the turbines symbolize efforts to save the area around Block Island from environmental ruin: “I think what it says is that the people who live in this place care about the place they live in, and they don’t want it to be destroyed.”

4.3. Path analysis

Based on exploratory linear regression analyses, we constructed a path model of key variables (Fig. 1) using IBM AMOS, with support for the Block Island Wind Farm as the ultimate endogenous variable. Path models assume causal relationships and provide an opportunity to understand interrelations among variables, using regression analyses. In a path analysis, variables serve as both independent and dependent variables, allowing researchers to determine indirect and total effects of predictors, as well as direct effects among variables.

The full model included relationships among all variables of interest (see Table 2), with insignificant relationships removed to arrive at a parsimonious model (Fig. 1) that includes only statistically significant ($p < .05$) direct relationships among variables. The data fit this final model well (CFI=0.971; RMSEA=0.083), and it explains 59.4% of the variance in wind farm support.

In this model, having fished at the Block Island Wind Farm (near or within the turbines) is a significant predictor of beliefs regarding the effects of the wind farm on fishing (0.397), but it does not have statistically significant direct effects on wind farm support. Belief that the wind energy development had positive effects on catch-related variables (fishing effects), however, does have a significant direct, positive effect on reported support for the project (0.205).

Perceived visual effects of the wind energy project have the largest direct effect on support (0.573), with more positive assessments of visual effects leading to greater support. The single item of belief that the Block Island Wind Farm is symbolic of clean energy is also a major direct predictor of support (0.459); moreover, this variable has substantial positive, direct effects on perceived visual effects (0.543). The symbolic meaning of the wind energy project is related to political orientation (0.366), with those of a more liberal orientation reporting higher agreement that the project is “symbolic of clean energy.”

Because the model includes both direct and indirect effects, these can

Table 2
Variables included in path analysis.

Variable	Definition	Percentage/ Mean (SD)
Fish at Wind Farm	Having fished “near (within 100 yards) or between the turbines, where you must navigate around the turbine foundations”	28.6%
Political Orientation	Responses to “How would you describe your political views” (5-point scale, very conservative to very liberal)	2.89 (0.925)
Symbolic of Clean Energy	Agreement that the wind farm is “symbolic of progress towards clean energy” (5-point scale, strongly disagree to strongly agree)	3.85 (0.917)
Visual Effects	Five-item latent variable ($\alpha = 0.898$) on visual effects of wind farm (5-point scale, very negative to very positive)	2.71 (0.808)
Fishing Effects	Six-item latent variable ($\alpha = 0.914$) on effects of wind farm on fish populations and fish landings (5-point scale, very negative to very positive)	3.19 (0.598)
Support for Block Island Wind Farm	Responses to “Do you support or oppose the Block Island Wind Farm” (5-point scale, strongly oppose to strongly support)	3.66 (1.10)

be summed to find total effects; total effects of the variables on support for the Block Island Wind Farm are presented in Table 3. Belief that the wind energy project is symbolic of progress towards clean energy has by far the greatest effects on wind farm support (0.824) in this model. Visual effects have the second greatest total effect (0.573). While respondent’s ratings of fishing effects have notable, though smaller, total

Table 3
Total effects in path analysis of anglers’ support for the Block Island Wind Farm.

	Political Orientation	Symbolic of Clean Energy	Fish at Wind Farm	Visual Effects	Fishing Effects
Symbolic of Clean Energy	0.366	--	--	--	--
Visual Effects	0.199	0.543	--	--	--
Fishing Effects	0.096	0.263	0.397	--	--
Support for Block Island Wind Farm	0.302	0.824	0.081	0.573	0.205

Note: Coefficients represent total, unstandardized effects of parsimonious path analysis model. Rows are dependent variables; columns are predictor variables.

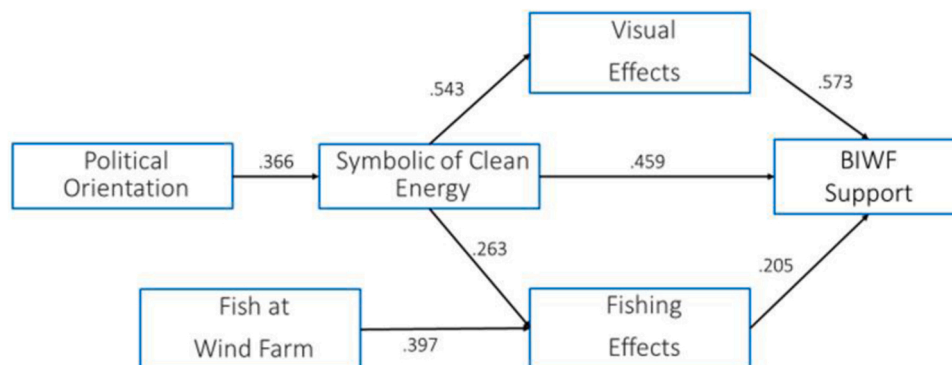


Fig. 1. Final path model for anglers’ support of the Block Island Wind Farm. Note: Model includes unstandardized coefficients for direct, statistically significant ($p < .05$) relationships between variables. Causal relationships assumed in the model are indicated by arrows. According to common indices of fit, the model fits the data well (CFI=0.971; RMSEA=0.083).

effects (0.205), the total effects of fishing at the wind farm on support are quite small (0.081) in comparison.

5. Discussion

Results from the survey of anglers, supported by interviews, demonstrate that participants in this study believe the Block Island Wind Farm has had positive impacts on catch-related variables, mixed effects on aesthetics, and is symbolic of a transition to more environmentally preferable sources of energy. Each of these beliefs is associated with overall support for the project among the anglers.

A path analysis confirms that fishing at the wind farm is also associated with support for the wind farm. This relationship is indirect, however, with those who fished at or near the turbines exhibiting more positive beliefs about the effects of the development on catch-related variables (numbers, diversity, and size of fish). Although the path analysis assumes a causal relationship, the direction of this relationship is not known. While anglers' attitudes may be influenced by successful experiences of fishing at the turbines, it is also possible that anglers with positive beliefs about fishing at the turbines are attracted to the site. Within the angling community, artificial reefs have a beneficial reputation, as they provide structure that aggregates fish [55]. The belief that the turbine bases will function as artificial reefs may attract anglers to the site; in fact, interviews with anglers confirm that the wind farm is serving as an attractant [10]. Longitudinal data tracking the attitudes of anglers before and after direct experience with wind energy installations would be helpful in disentangling this relationship.

Yet, despite perceptions that the Block Island Wind Farm has positive effects on fish and fish habitat, these catch-relevant beliefs were a relatively minor predictor of support among survey respondents. Rather, a non-catch aspect of the fishing experience—visual aesthetics—had a stronger relationship with support. Consistent with other studies of community acceptance of offshore wind energy, visual aspects had major, direct associations with attitudes towards the project. More positive attitudes towards the visual effects were solid predictors of greater project support, and vice versa. Our interviews revealed that some anglers view the turbine appearance in positive terms, and a slim majority of survey respondents like the way the turbines look. However, on average, survey respondents reported somewhat negative attitudes towards the visual effects of the wind farm. This may be reflected in slight agreement among survey respondents, on average, that the wind farm “causes the loss of something intangible, where all you see is the ocean.” Interestingly, fishing at the wind farm did not have a statistically significant relationship with attitudes towards its visual impacts. Instead, ratings about the visual effects of the project were clearly associated with the symbolic value of the wind farm. The more a respondent agreed that the project was “symbolic of progress towards clean energy,” the more favorable they were regarding the visual effects.

Via its indirect influence on attitudes towards visual effects and substantial direct effects, beliefs that the Block Island Wind Farm was symbolic of progress towards clean energy was the strongest predictor of project support among survey respondents. This is consistent with Firestone et al. [30], who found that supporters agreed most with this descriptor of the wind farm. Agreement with this symbolic characterization of the project not only predicts more positive assessments of its visual impacts but is also related to more positive assessments of the wind farm's effects on catch-related aspects. These relationships indicate that perceived symbolism reflects a broader attitude of the respondents towards renewable energy in general, or perhaps offshore wind energy in particular. The symbolic meaning of the wind farm may thus operate as an ideological filter for perceptions of the project.

Note that in this study, a more liberal political orientation was associated with higher beliefs in the symbolic value of the wind energy project. Past research has established a link between underlying values and support for renewable energy projects [54,56], including the Block Island Wind Farm [23]. In these studies, greater levels of altruism

(concern for the welfare of others) are associated with greater support of renewable energy. The influence of political orientation on symbolic beliefs, and the effects of symbolic beliefs on perceived impacts of the project, may indicate that underlying values ultimately have a stronger influence on support of the wind farm among anglers than variables related directly to the fishing experience.

These results shed light on future research needed to fully understand anglers' responses to offshore wind energy and other issues that affect the fishing experience. Most of the social science on anglers is narrowly focused on fisheries management issues (such as shark conservation; see [57,58]), whereas little research has been conducted on attitudes toward other marine governance issues that affect fisheries. Moreover, social science on recreational marine angling has lagged behind research on commercial fishing [59]. However, social science can be an important tool for revealing how this prominent group of marine recreationalists thinks about broader management issues. For example, one study found that stronger identification as an angler is associated with greater support for public and private conservation behaviors [60]; conversely, another study found that more experienced anglers oppose conservation measures such as marine protected areas [61].

While this study confirms the importance of recognizing both catch and non-catch aspects of the angling experience, it also highlights the need for research on characteristics of anglers that are not related to fishing. While there is an extensive literature on the human dimensions of recreational fishing [62], there is need for more research connecting demographic differences and environmental attitudes of recreational anglers to attitudes towards broader environmental policy or marine governance issues, including offshore wind energy development. In short, while effects on recreational fishing experiences may influence anglers' support for marine governance decisions, their more general beliefs and underlying values may be even more important to study in order to understand their responses to offshore energy development and other marine governance issues.

6. Conclusions

Increased research into recreational anglers and their attitudes toward offshore wind energy is critical for the siting and development of a sustainable offshore wind energy sector, due to the importance of recreational fishing for ocean and coastal economies and quality of life in coastal communities. Given the high profile and increasingly litigious nature of conflicts between offshore wind energy and commercial fisheries, it is particularly important that social science research highlight differences between the recreational and commercial fishing communities.

Our research shows that anglers may perceive impacts of offshore wind farms on the fishing experience, even if they continue to catch desired species. Non-catch aspects of wind energy developments include visual effects and the potential crowding that can result from the role of wind turbines as a fishing destination. Although beliefs about its effects on the fishing experience predicted anglers' subsequent support for the Block Island Wind Farm, attitudes about visual effects and perceived clean energy symbolism of the project were more powerful predictors of support for the wind farm. Future fisheries social science research should dig more deeply into how underlying values and beliefs of recreational anglers influences their support for offshore wind energy and other marine governance issues. Assuming that recreational anglers are interested only in catch, or even non-catch, aspects of the fishing experience will provide only a partial understanding of attitudes and motivations. Indeed, Wolsink [15] argues that research on social acceptance of energy technologies can “debunk widely held, common sense ideas among actors involved in diffusion and implementation of renewables...” (p. 288).

Finally, we recognize that the complexity of anglers' attitudes towards renewable energy technology and their diversity of beliefs creates

a challenge for making decisions that will serve their interests. This is critical, as recreational angling is a prominent existing use of marine space, with economic, historical, and cultural significance. Moreover, there is increasing evidence that managers are employing new methods, such as multi-use, in attempting to resolve conflicts between existing ocean uses, such as fishing, and new uses like offshore wind (e.g. [6]). However, we argue that approaches like multi-use, which may be designed to facilitate coexistence, are unlikely to succeed unless managers develop a deeper, more nuanced understanding of ocean users' beliefs and attitudes. As such, this research supports the call for greater engagement of recreational anglers in decisions regarding offshore wind energy development. This engagement should take place not just for the permitting of individual projects, but also for broader decisions regarding the siting of wind energy and other ocean uses (see [42,63]). Through meaningful participation in decision making, managers can come to understand and respond to not only the fishing-related aspects of marine governance decisions, but also the broader ideological beliefs and values guiding angler responses.

Government disclaimer

The views in this paper are the authors' own and do not represent those of the U.S. Coast Guard, the Department of Homeland Security, or any other agency or office of the U.S. Government.

Conflict of interest

The authors declare no competing or conflicting interests with this work.

Data Availability

Data will be made available on request.

Acknowledgments

This research was funded by Rhode Island Sea Grant project R/1822-1820-211-01; a portion of this work was supported by the U.S. Department of Agriculture National Institute of Food and Agriculture Hatch Project 1007596. We thank collaborators Tracey Dalton and Julia Livermore; student research assistants Dina Elias and Samuel Filiaggi; project advisory committee members Capt. Rick Bellavance, David Beutel, Capt. David Monti, Christopher Parkins, and Amy Stillings; and all of our study participants.

References

- [1] International Renewable Energy Agency, Wind Energy Data, (n.d.). <https://www.irena.org/Energy-Transition/Technology/Wind-energy> (accessed January 17, 2023).
- [2] C. Hagggett, T. ten Brink, A. Russell, M. Roach, J. Firestone, T. Dalton, B.J. McCay, Offshore wind projects and fisheries: Conflict and engagement in the United Kingdom and the United States, *Oceanography* 33 (2020) 38–47.
- [3] C. Pomeroy, M. Hall-Arber, F. Conway, Power and perspective: Fisheries and the ocean commons beset by demands of development, *Mar. Policy* 61 (2015) 339–346, <https://doi.org/10.1016/j.marpol.2014.11.016>.
- [4] V. Stelzenmüller, J. Letschert, A. Gimpel, C. Kraan, W.N. Probst, S. Degraer, R. Döring, From plate to plug: the impact of offshore renewables on European fisheries and the role of marine spatial planning, *Renew. Sustain. Energy Rev.* 158 (2022), 112108.
- [5] Y. Zhang, C. Zhang, Y.-C. Chang, W.-H. Liu, Y. Zhang, Offshore wind farm in marine spatial planning and the stakeholders engagement: Opportunities and challenges for Taiwan, *Ocean Coast. Manag.* 149 (2017) 69–80.
- [6] M.F. Schupp, A. Kafas, B.H. Buck, G. Krause, V. Onyango, V. Stelzenmüller, I. Davies, B.E. Scott, Fishing within offshore wind farms in the North Sea: Stakeholder perspectives for multi-use from Scotland and Germany, *J. Environ. Manag.* 279 (2021), 111762, <https://doi.org/10.1016/j.jenvman.2020.111762>.
- [7] N.A. Steins, J.A. Veraart, J.E. Klostermann, M. Poelman, Combining offshore wind farms, nature conservation and seafood: Lessons from a Dutch community of practice, *Mar. Policy* 126 (2021), 104371.
- [8] T. Gray, C. Hagggett, D. Bell, Offshore wind farms and commercial fisheries in the UK: A study in Stakeholder Consultation, *Ethics Place Environ.* 8 (2005) 127–140, <https://doi.org/10.1080/13668790500237013>.
- [9] T. Hooper, M. Ashley, M. Austen, Perceptions of fishers and developers on the co-location of offshore wind farms and decapod fisheries in the UK, *Mar. Policy* 61 (2015) 16–22.
- [10] T. Smythe, D. Bidwell, G. Tyler, Optimistic with reservations: The impacts of the United States' first offshore wind farm on the recreational fishing experience, *Mar. Policy* 127 (2021), 104440.
- [11] T. Hooper, C. Hattam, M. Austen, Recreational use of offshore wind farms: Experiences and opinions of sea anglers in the UK, *Mar. Policy* 78 (2017) 55–60.
- [12] S. Batel, Research on the social acceptance of renewable energy technologies: Past, present and future, *Energy Res. Soc. Sci.* 68 (2020) 101544.
- [13] P. Devine-Wright, S. Batel, O. Aas, B. Sovacool, M.C. Labelle, A. Ruud, A conceptual framework for understanding the social acceptance of energy infrastructure: Insights from energy storage, *Energy Policy* 107 (2017) 27–31, <https://doi.org/10.1016/j.enpol.2017.04.020>.
- [14] P. Upham, C. Oltra, À. Boso, Towards a cross-paradigmatic framework of the social acceptance of energy systems, *Energy Res. Soc. Sci.* 8 (2015) 100–112.
- [15] M. Wolsink, Social acceptance revisited: Gaps, questionable trends, and an auspicious perspective, *Energy Res. Soc. Sci.* 46 (2018) 287–295, <https://doi.org/10.1016/j.erss.2018.07.034>.
- [16] R. Wüstenhagen, M. Wolsink, M.J. Bürer, Social acceptance of renewable energy innovation: An introduction to the concept, *Energy Policy* 35 (2007) 2683–2691.
- [17] S. Batel, A critical discussion of research on the social acceptance of renewable energy generation and associated infrastructures and an agenda for the future, *J. Environ. Policy Plan* 20 (2018) 356–369.
- [18] S. Batel, P. Devine-Wright, T. Tangeland, Social acceptance of low carbon energy and associated infrastructures: A critical discussion, *Energy Policy* 58 (2013) 1–5, <https://doi.org/10.1016/j.enpol.2013.03.018>.
- [19] D. Bidwell, Tourists are people too: Nonresidents' values, beliefs, and acceptance of a nearshore wind farm, *Energy Policy* 173 (2023), 113365.
- [20] D. Bell, T. Gray, C. Hagggett, J. Swaffield, Re-visiting the 'social gap': Public opinion and relations of power in the local politics of wind energy, *Environ. Polit.* 22 (2013) 115–135, <https://doi.org/10.1080/09644016.2013.755793>.
- [21] D. Bell, T. Gray, C. Hagggett, The 'social gap' in wind farm siting decisions: Explanations and policy responses, *Environ. Polit.* 14 (2005) 460–477.
- [22] C. Hagggett, Understanding public responses to offshore wind power, *Energy Policy* 39 (2011) 503–510, <https://doi.org/10.1016/j.enpol.2010.10.014>.
- [23] D. Bidwell, Ocean beliefs and support for an offshore wind energy project, *Ocean Coast. Manag.* 146 (2017) 99–108.
- [24] B. Wiersma, P. Devine-Wright, Public engagement with offshore renewable energy: A critical review, *Wiley Interdiscip. Rev. Clim. Change* 5 (2014) 493–507.
- [25] J. Ladenburg, A. Dubgaard, Preferences of coastal zone user groups regarding the siting of offshore wind farms, *Ocean Coast. Manag.* 52 (2009) 233–242, <https://doi.org/10.1016/j.ocecoaman.2009.02.002>.
- [26] V. Westerberg, J.B. Jacobsen, R. Lifran, Offshore wind farms in Southern Europe—Determining tourist preference and social acceptance, *Energy Res. Soc. Sci.* 10 (2015) 165–179.
- [27] P. Devine-Wright, Y. Howes, Disruption to place attachment and the protection of restorative environments: A wind energy case study, *J. Environ. Psychol.* 30 (2010) 271–280.
- [28] K. Gee, Offshore wind power development as affected by seascape values on the German North Sea coast, *Land Use Policy* 27 (2010) 185–194.
- [29] A. Russell, J. Firestone, D. Bidwell, M. Gardner, Place meaning and consistency with offshore wind: An island and coastal tale, *Renew. Sustain. Energy Rev.* 132 (2020), 110044, <https://doi.org/10.1016/j.rser.2020.110044>.
- [30] J. Firestone, D. Bidwell, M. Gardner, L. Knapp, Wind in the sails or choppy seas?: People-place relations, aesthetics and public support for the United States' first offshore wind project, *Energy Res. Soc. Sci.* 40 (2018) 232–243, <https://doi.org/10.1016/j.erss.2018.02.017>.
- [31] M.D. Ferguson, S.L. Powers, N. Trautwein, J.B. Jacquet, A.R. Graefe, A.J. Mowen, Winds of change—Predicting water-based recreationists' support and opposition for offshore wind energy development in the Great Lakes, *J. Gt. Lakes Res.* 45 (2019) 187–195.
- [32] G. Parsons, J. Firestone, L. Yan, J. Toussaint, The effect of offshore wind power projects on recreational beach use on the east coast of the United States: Evidence from contingent-behavior data, *Energy Policy* 144 (2020), 111659, <https://doi.org/10.1016/j.enpol.2020.111659>.
- [33] V. Westerberg, J.B. Jacobsen, R. Lifran, The case for offshore wind farms, artificial reefs and sustainable tourism in the French mediterranean, *Tour. Manag.* 34 (2013) 172–183, <https://doi.org/10.1016/j.tourman.2012.04.008>.
- [34] T.S. ten Brink, T. Dalton, Perceptions of commercial and recreational fishers on the potential ecological impacts of the Block Island Wind Farm (US), *Front. Mar. Sci.* 5 (2018), <https://doi.org/10.3389/fmars.2018.00439>.
- [35] A.B. Gill, S. Degraer, A. Lipsky, N. Mavraki, E. Methratta, R. Brabant, Setting the context for offshore wind development effects on fish and fisheries, *Oceanography* 33 (2020) 118–127.
- [36] E.T. Methratta, A. Hawkins, B.R. Hooker, A. Lipsky, J.A. Hare, Offshore wind development in the Northeast US Shelf large marine ecosystem, *Oceanography* 33 (2020) 16–27.
- [37] R. Arlinghaus, J.K. Abbott, E.P. Fenichel, S.R. Carpenter, L.M. Hunt, J. Alós, T. Klefoth, S.J. Cooke, R. Hilborn, O.P. Jensen, M.J. Wilberg, J.R. Post, M.J. Manfredo, Governing the recreational dimension of global fisheries, *Proc. Natl. Acad. Sci.* 116 (2019) 5209–5213. <https://doi.org/10.1073/pnas.1902796116>.

- [38] N. Mavraki, S. Degraer, J. Vanaverbeke, Offshore wind farms and the attraction–production hypothesis: Insights from a combination of stomach content and stable isotope analyses, *Hydrobiologia* 848 (2021) 1639–1657, <https://doi.org/10.1007/s10750-021-04553-6>.
- [39] T. Smythe, D. Bidwell, A. Moore, H. Smith, J. McCann, Beyond the beach: Tradeoffs in tourism and recreation at the first offshore wind farm in the United States, *Energy Res. Soc. Sci.* 70 (2020), 101726, <https://doi.org/10.1016/j.erss.2020.101726>.
- [40] R. Arlinghaus, On the apparently striking disconnect between motivation and satisfaction in recreational fishing: The case of catch orientation of German anglers, *North Am. J. Fish. Manag.* 26 (2006) 592–605.
- [41] M. Birdsong, L.M. Hunt, R. Arlinghaus, Recreational angler satisfaction: What drives it? *Fish Fish.* 22 (2021) 682–706.
- [42] T.C. Smythe, J. McCann, Lessons learned in marine governance: Case studies of marine spatial planning practice in the US, *Mar. Policy* 94 (2018) 227–237.
- [43] A. Carr-Harris, C. Lang, Sustainability and tourism: The effect of the United States' first offshore wind farm on the vacation rental market, *Resour. Energy Econ.* 57 (2019) 51–67.
- [44] H. Smith, T. Smythe, A. Moore, D. Bidwell, J. McCann, The social dynamics of turbine tourism and recreation: Introducing a mixed-method approach to the study of the first US offshore wind farm, *Energy Res. Soc. Sci.* 45 (2018) 307–317.
- [45] S. Trandafir, V. Gaur, P. Behanan, E. Uchida, C. Lang, H. Miao, How are tourists affected by offshore wind turbines? A case study of the first US offshore wind farm, *J. Ocean Coast. Econ.* 7 (2020) 1.
- [46] D.A. Dillman, J.D. Smyth, L.M. Christian, Internet, phone, mail, and mixed-mode surveys: The tailored design method, John Wiley & Sons., 2014.
- [47] V. Braun, V. Clarke, Using thematic analysis in psychology, *Qual. Res. Psychol.* 3 (2006) 77–101, <https://doi.org/10.1191/1478088706qp063oa>.
- [48] V. Clarke, V. Braun, Thematic analysis: A practical guide, *Themat. Anal.* (2021) 1–100.
- [49] R.C. Stedman, N.A. Connelly, T.A. Heberlein, D.J. Decker, S.B. Allred, The end of the (research) world as we know it? Understanding and coping with declining response rates to mail surveys, *Soc. Nat. Resour.* 32 (2019) 1139–1154, <https://doi.org/10.1080/08941920.2019.1587127>.
- [50] L. Anderson, M. Jans, A. Lee, C. Doyle, H. Driscoll, J. Hilger, Effects of survey response mode, purported topic, and incentives on response rates in human dimensions of fisheries and wildlife research, *Hum. Dimens. Wildl.* 27 (2022) 201–219, <https://doi.org/10.1080/10871209.2021.1907633>.
- [51] Recreational Boating and Fishing Foundation, Outdoor Foundation, 2018 Special Report on Fishing, n.d. https://www.takemefishing.org/getmedia/131d699b-5964-4626-afe8-927f7b105f46/2018-Special-Report-on-Fishing_FINAL.pdf (accessed January 16, 2023).
- [52] S.G. Sutton, R.B. Ditton, Understanding catch-and-release behavior among U.S. atlantic bluefin tuna anglers, *Hum. Dimens. Wildl.* 6 (2001) 49–66, <https://doi.org/10.1080/10871200152668698>.
- [53] A.A. Brinson, K. Wallmo, Determinants of saltwater anglers' satisfaction with fisheries management: Regional perspectives in the United States, *North Am. J. Fish. Manag.* 37 (2017) 225–234.
- [54] D. Bidwell, The role of values in public beliefs and attitudes towards commercial wind energy, *Energy Policy* 58 (2013) 189–199.
- [55] A.B. Paxton, K.W. Shertzer, N.M. Bachele, G.T. Kellison, K.L. Riley, J.C. Taylor, Meta-Analysis Reveals Artificial Reefs Can Be Effective Tools for Fish Community Enhancement but Are Not One-Size-Fits-All, *Front. Mar. Sci.* 7 (2020). <https://www.frontiersin.org/article/10.3389/fmars.2020.00282> (accessed June 29, 2022).
- [56] G. Perlaviciute, L. Steg, The influence of values on evaluations of energy alternatives, *Renew. Energy* 77 (2015) 259–267, <https://doi.org/10.1016/j.renene.2014.12.020>.
- [57] J.M. Drymon, S.B. Scyphers, Attitudes and perceptions influence recreational angler support for shark conservation and fisheries sustainability, *Mar. Policy* 81 (2017) 153–159, <https://doi.org/10.1016/j.marpol.2017.03.001>.
- [58] K. McClellan Press, J. Mandelman, E. Burgess, S.J. Cooke, V.M. Nguyen, A. J. Danylchuk, Catching sharks: Recreational saltwater angler behaviours and attitudes regarding shark encounters and conservation: Saltwater angler behaviours and attitudes regarding shark encounters, *Aquat. Conserv. Mar. Freshw. Ecosyst.* 26 (2016) 689–702, <https://doi.org/10.1002/aqc.2581>.
- [59] K. Hyder, C.D. Maravelias, M. Kraan, Z. Radford, R. Prellezo, Marine recreational fisheries — current state and future opportunities, *ICES J. Mar. Sci.* 77 (2020) 2171–2180, <https://doi.org/10.1093/icesjms/fsaa147>.
- [60] A.C. Landon, G.T. Kyle, C.J. van Riper, M.A. Schuett, J. Park, Exploring the psychological dimensions of stewardship in recreational fisheries, *North Am. J. Fish. Manag.* 38 (2018) 579–591, <https://doi.org/10.1002/nafm.10057>.
- [61] C.L. Martin, S. Momtaz, A. Jordan, N.A. Moltchanivskyj, Exploring recreational fishers' perceptions, attitudes, and support towards a multiple-use marine protected area six years after implementation, *Mar. Policy* 73 (2016) 138–145, <https://doi.org/10.1016/j.marpol.2016.08.002>.
- [62] L.M. Hunt, S.G. Sutton, R. Arlinghaus, Illustrating the critical role of human dimensions research for understanding and managing recreational fisheries within a social-ecological system framework, *Fish. Manag. Ecol.* 20 (2013) 111–124, <https://doi.org/10.1111/j.1365-2400.2012.00870.x>.
- [63] D. Bidwell, Thinking through participation in renewable energy decisions, *Nat. Energy* 1 (2016) 16051.