Engaged minority or quiet majority? Social intentions and actions related to offshore wind energy development in the United States

Keywords: social action, offshore wind energy, public opinion, spatial analysis, public engagement, Carolina coast

1. Introduction

A major focus of wind energy research has been drivers of opposition for local projects [1,2]. Rand and Hoen [3] summarized wind energy acceptance literature in the United States (U.S.) and identified six overarching themes driving support level: socioeconomic aspects; sound annoyance and health risk perceptions; visual/landscape aspects, visual annoyance, and place attachment; environmental concerns and attitudes; perceptions of planning process, perceived fairness, and trust; and distance from turbines. Level of support for offshore wind energy projects, specifically, is linked to aesthetics [4]; economic benefits [5]; recreation impacts [6]; community acceptance [7]; place attachment [8]; environmental harm [9]; and proximity to energy development sites [10].

While there is some understanding of the factors influencing support or opposition to local wind energy projects, less is known about what drives engagement in social action to advance a position. Social action can broadly be defined to include both political and civic engagement activities (e.g., contacting a government official, attending public meetings), as well as activism and mobilization activities (e.g., participating in demonstrations, contributing money to a social movement campaign). One theory of social action is the value-belief-norm theory of support for environmentalism, which suggests that individuals who accept a movement's basic values, believe valued items are threatened, and feel a personal obligation or norm to restore those values are more likely to take action [11,12]. Engagement in pro-environmental behavior can also be influenced by perceived moral obligations, altruism, and self-interest [13]. Schmitt et al. [14] postulated that politicized environmental identification, or identification with a group that is collectively engaged to create pro-environmental social change, drives participation in environmental social action. This is exemplified by Fisher and Narin's [15] affiliation network analysis of those involved in local youth climate activism in the U.S. in 2019 and 2020. Aspects of place attachment have also been associated with pro-environmental civic engagement [16], environmental stewardship activities [17], and climate-related civic engagement [18]. Researchers documented relationships between intended social action and place attachment and between intended social action and place satisfaction [19], and suggested relationships between social action and stakeholder group membership [20] as well as collective identity [21], which may further influence decisions to engage in either supportive or oppositional actions.

Social action literature related to energy development efforts has largely focused on past action or social movements and mobilization efforts. For example, in a study of constructed onshore wind energy projects, Firestone et al. [8] found that awareness and place attachment influenced past participation in pre-construction planning processes (e.g., attending or speaking at meetings, putting up signs). In another assessment of 53 proposed onshore wind energy projects in the western U.S., Giordono et al. [22] found that threat framing, especially related to wildlife, aesthetics, and economic losses, were key motivators of oppositional activities, including letter writing, commenting at public hearings, and demonstrations. They found that opposition mobilization activities were more likely to occur for projects with multiple layers of governance, especially when involving the federal government. This is exemplified by the Cape

Wind project in Massachusetts – the first attempt at offshore wind energy development in the U.S., which was abandoned after decades of legal challenges [23,24].

While studies focused on social movements and successful mobilization efforts offer insight to researchers and managers of energy development, McAdam and Boudet [25] stressed that this narrow focus often excludes broader understandings of social action to include mobilization attempts as well as groups who may be more likely to mobilize. Therefore, further studies of intended social action are warranted. Relevant to offshore wind energy, Devine-Wright and Howes [26] and Gonyo et al. [27] found that those with strong place attachment were more likely to engage in place-protective behaviors, such as active opposition. Gonyo et al. [27] also found that support level, engagement in past action, and household distance to the shoreline were influential in the intent to engage in action either for or against offshore wind energy development in the Carolinas, specifically.

Because distance from proposed wind energy development projects has been a key explanatory factor for support level and social action, it follows that spatial analysis of these concepts can further inform understanding of public opinion and propensity to engage in social action. Wind energy studies that include spatial elements have largely focused on individual and household proximity to the location, or proposed location, of wind arrays (e.g., [28,29]). These studies often evaluate the importance of aesthetics (e.g., [30,31]), perceived visibility of turbines (e.g., [32,33]), and often contested "Not in My Back Yard" (NIMBY) relationships (e.g., [1,34,35]). Rand and Hoen [3] proposed that common proximity measures related to wind energy development primarily affect other explanatory variables, such as sound annoyance or socioeconomic impacts, rather than influence support level or social action directly, suggesting a need for additional spatial research. In energy generation more generally, two studies used spatial methods to characterize differences in awareness and support level toward hydraulic fracturing and natural oil and gas drilling [36,37]. Both found that spatial delineations resulted in differences in support level for the energy development effort under consideration, but neither examined engagement in social action.

Specific to offshore wind energy, comparative spatial analyses of adjacent communities are notably uncommon, despite being critical to understanding public opinion [37]. Firestone et al. [32] examined support level and perceived planning process fairness for two populations adjacent to two offshore wind energy development projects. They found differences between the two populations, but did not explore additional heterogeneity within them. Ladenburg et al. [38] combined a stated preference study with Geographic Information System (GIS) data to explore spatial willingness-to-pay preferences for onshore and offshore wind turbines. Spatial factors, including average respondent distance to the nearest proposed turbine, were found to significantly influence respondent preferences for potential offshore wind energy development, as were socioeconomic characteristics, including age, income, and gender. Neither of these studies explored social action, and as pressures on the coastal zone increase, so does the need for spatially explicit, empirical assessments for use in coastal planning [39] to further policies related to energy development.

Community engagement is a critical component of energy development processes because it communicates receptivity of such efforts as well as local community needs related to energy generation. However, if only certain subpopulations engage, it is possible for agencies to misinterpret public support level or perceive uniformity across heterogeneous landscapes. Therefore, an enhanced understanding of these spatial differences is required. The goal of this study was to examine whether spatial variability of

resident social action relative to the potential for offshore wind energy development would emerge from a given population. Building upon existing research [27], spatial clusters within coastal populations of North Carolina and South Carolina were identified using awareness, support level, and intended action. Perceived impacts, place attachment, and demographic characteristics were then compared between clusters to theorize why these differences may exist and how these findings can be used for potential improvement of offshore wind energy development processes.

2. Methods and Data

2.1 Sampling design

In early 2018, a random household survey of residents 18 years of age or older was conducted in portions of Brunswick, Columbus, New Hanover, and Pender Counties in North Carolina and Horry County in South Carolina (Figure 1) [dataset] [40,27]. These counties were adjacent to regions proposed for offshore wind energy development and are comprised of both rural and urban areas, including Myrtle Beach in South Carolina and Wilmington in North Carolina, as well as smaller rural communities, seasonal beach communities, and protected conservation areas. As such, the sampling design included both rural and urban Census Blocks, and was further stratified by state and distance bands to capture households within two miles (3.2 kilometers), between two and five miles (8.0 km), and between five and twenty miles (32.2 km) of the shoreline. The survey yielded a response rate of 33% (3,953 respondents), and responses were weighted using iterative proportional fitting (raking) to account for sampling design and mitigate non-response bias. Weighting control factors included sex, race (Black, White), and age group (18-34, 35-44, 45-54, 55-64, 65-74, and 75+). In order to reduce the mean squared error of key outcome estimates, weights were trimmed to no less than 0.5 and no greater than five [41].

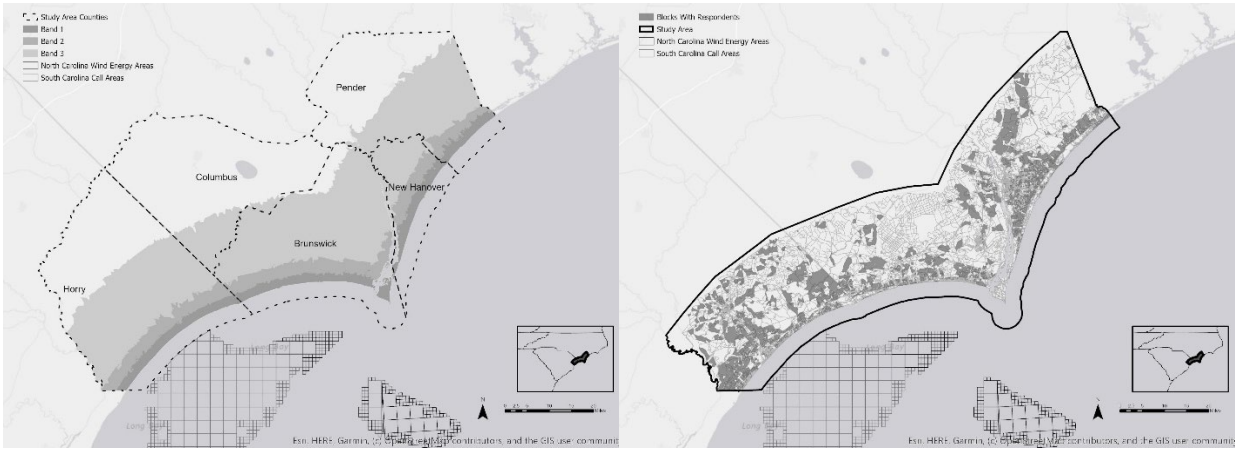

Figure 1. Sampling geography and coverage (as shown in [27])

2.2 Survey data

Respondents were provided the map shown in Figure 2 to define the study area. The survey asked about level of awareness of and support for the potential for offshore wind energy development efforts within the U.S., North Carolina, and South Carolina, respectively, using five-point Likert scales (please see supplemental material for full survey instrument). Respondents were also asked if and how they had ever expressed support or opposition for the potential for offshore wind energy development in any city, county, or state where they have lived, specific to the six action types listed below. They were then asked

if they intended to engage in any of those action types related to the potential for offshore wind energy development in their current city, county, or state within the next 12 months. Past action types included:

- Contributed money to an organization or campaign
- Attended public meetings sponsored by a government agency
- Attended public meetings, gatherings, or demonstrations sponsored by an advocacy group
- Signed a petition
- Written, emailed, or called a public official
- Joined a citizen-based advocacy group because of their position

The survey also collected the importance of a series of "quality of life" items using a five-point Likert scale, in addition to asking whether respondents thought that development of offshore wind energy would positively, negatively, or not impact each item. Items included:

- Daytime ocean views
- Nighttime ocean views
- Community image
- Shipwrecks and other submerged maritime heritage sites
- Tax revenues
- Electricity affordability
- Job opportunities
- Local property values
- Recreational fishing
- Habitat for marine mammals and sea turtles
- Habitat for fish
- Habitat for birds

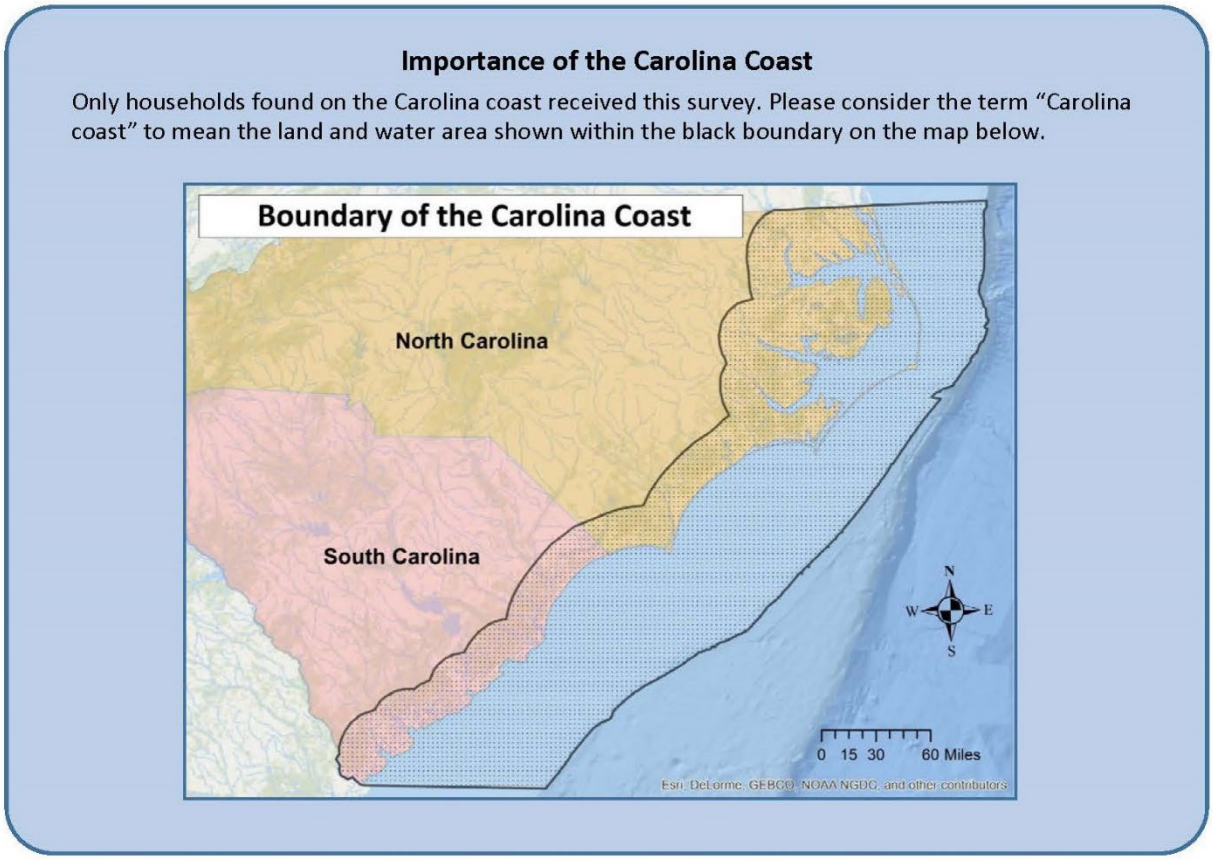

Figure 2. Study area of the Carolina coast as shown to survey respondents

Finally, the survey collected respondents' level of agreement or disagreement with eight statements to capture four dimensions of place attachment (biophysical, sociocultural, psychological, and political-economic) along the defined Carolina coast [42] (Table 1).

Table 1: Place attachment dimensions, statements, and factor analysis results

Dimension	Survey Statement
Biophysical	I think the natural parts of the Carolina coast are beautiful.
	I like the Carolina coast's mix of plants, animals, and landscapes.
Psychological	The Carolina coast is a special place for me and/or my family.
	The Carolina coast says a lot about who I am.
Political-economic	I think the economy is strong on the Carolina coast
	The Carolina coast is the best place for what I like to do.
Sociocultural	I feel connected to the other people who live on the Carolina coast.
	I feel a strong sense of community on the Carolina coast.

2.3 Spatial and tabular statistics

Multivariate cluster analysis within ArcGIS Pro [43] was used to characterize structural patterns and identify spatial clusters along the Carolina coast. The cluster analysis used the Calinski-Harabasz pseudo F-statistic, which is a ratio of between-cluster variance to within-cluster variance [44]. This analysis is an unsupervised method that allows groups to emerge from respondents with similar traits, and it can

consider spatial relationships as a factor in addition to survey responses. This method is useful when there are no hypothesized groupings to inform the analysis, as clustering can determine the statistical optimum number of groups, and is commonly used in spatial statistics [45] and within ArcGIS. Survey respondents were aggregated to the Census Block Group level, and awareness and support level within one's own state, as well as intended action within one's current city, county, or state were used as inputs based on the statistically significant yet complex relationships found between these variables in Gonyo et al. [27]. The clustering model was specified using standard k-means clustering methods and optimized seed initialization. Results of the cluster analysis suggested the optimum number of statistical clusters was two (pseudo-F 129.5). T-tests were then used to compare differences in proportions of characteristics between the clusters within Stata 16.1 [46].

3. Results

This section first presents the results of the cluster analysis, including differences between clusters and among the clustering variables, as well as demographic characteristics. Next, differences in perceived impacts between clusters are assessed, followed by differences in place attachment between clusters.

3.1 Cluster analysis

The results of the cluster analysis are shown in Figure 3. Cluster 1 (n=1,456) includes roughly one-third of study area residents, or 237,837 residents (according to 2010 Census data), and is largely comprised of North Carolina residents (88.3%). Cluster 2 (n=2,137), 476,820 residents, is primarily composed of South Carolina residents (71.9%), with the inclusion of residents from some of North Carolina's more rural areas as well as parts of Wilmington. The percent land cover of cluster 1 that is Census-designated as urban is 12.0%, and cluster 2 has 17.6% Census-designated urban land cover [dataset] [47]. Additional investigation suggests that the clusters are less influenced by state boundaries and are more influenced by urban centers, where cluster 1 appears more rural and cluster 2 appears more urban. Cluster 2 is significantly further from the coast than cluster 1 (t=9.17, p=0.000) within both states (North Carolina: t=6.51, p<0.01; South Carolina: t=1.78, p=0.08).

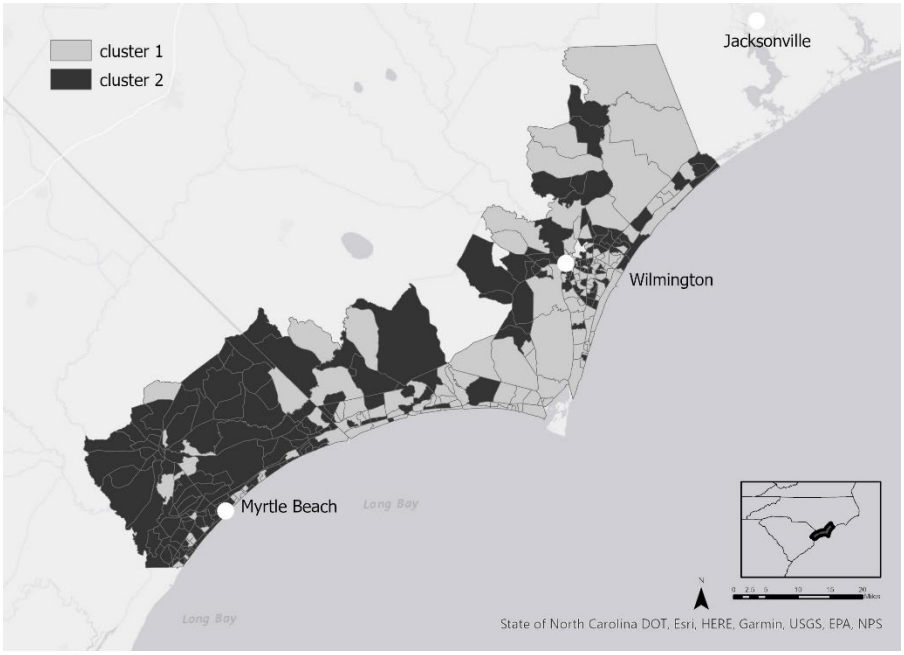

Figure 3: Spatial representation of cluster analysis – cluster 1 and cluster 2

Population demographics for the study region indicate that weighted respondents are slightly older, more White, less Black, and less Hispanic; however, clusters are generally reflective of their respective population trends. Table 2 explores demographic characteristics by cluster. Cluster 1 tends to be older, less racially diverse, more educated, and more affluent than cluster 2. Residents in cluster 1 have greater household incomes, yet are more likely to be self-employed, retired, or a homemaker than residents within cluster 2. Additionally, their property along the Carolina coast is more likely to be a secondary home. Alternatively, residents within cluster 2 are more likely to be employed full-time, have children under 18 years of age living at home with them, and are more likely to be Black or Hispanic than residents of cluster 1.

Table 2: Demographic profile of clusters

Characteristic		Cluster 1 (%)	Cluster 2 (%)	Significance
Sex	Female	49.6	54.4	t=1.97, p=0.05
Age	Under 35	16.4	24.4	t=2.96, p<0.01
	35-44	13.4	16.5	t=1.62, p=0.11
	45-54	15.1	17.0	t=1.11, p=0.27
	55-64	22.1	17.5	t=2.79, p<0.01
	65 and over	34.8	27.3	t=4.17, p<0.01
Race	Black	4.7	8.1	t=2.30, p=0.02
	White	93.0	88.2	t=2.62, p=0.01
Ethnicity	Hispanic	0.9	2.5	t=1.89, p=0.06
Education	No schooling or some high school (no diploma)	1.7	1.7	t=0.03, p=0.97
	High school diploma/ GED through Associate's degree	38.6	52.8	t=5.92, p<0.01
	Bachelor's degree or more	59.7	45.5	t=5.92, p<0.01
Employment	Unemployed	1.7	2.4	t=0.93, p=0.35
	Employed full-time	33.7	44.5	t=4.41, p<0.01
	Employed part-time	9.4	8.6	t=0.49, p=0.62
	Self-employed	12.5	9.9	t=1.67, p<0.01
	Retired	35.6	28.0	t=3.99, p<0.01
	Student	1.4	2.1	t=0.84, p=0.40
	Homemaker	4.5	2.6	t=1.89, p=0.06
Family Structure	Children under 18	26.1	31.3	t=2.12, p=0.03
Household income	Less than $35,000	16.4	19.5	t=1.48, p=0.14
	$35,000-$99,999	45.6	53.9	t=3.31, p<0.01
	$100,000 or more	38.0	26.6	t=4.86, p<0.01
Residency	Temporary or seasonal	8.1	4.0	t=3.32, p<0.01
	Permanent	91.9	96.0	t=3.32, p<0.01

Figure 4 shows levels of awareness and support by statistical cluster. The region has relatively high levels of support and low levels of awareness. Compared to residents within cluster 2, residents of cluster 1 are about twice as likely to be opposed ($t=7.66$, $p<0.01$) to offshore wind energy development within their own state and about 50% more likely to be at least slightly aware ($t=8.11$, $p<0.01$) of development within their own state. Residents of cluster 1 are equally likely to be strongly opposed or neutral ($t=0.33$, $p=0.74$), but are more likely to be somewhat or strongly supportive than neutral ($2.26<t<2.92$, $0.01<p<0.02$). Residents of cluster 2 are more likely to be neutral, somewhat supportive, or strongly supportive than strongly opposed ($9.95<t<11.47$, $p<0.01$).

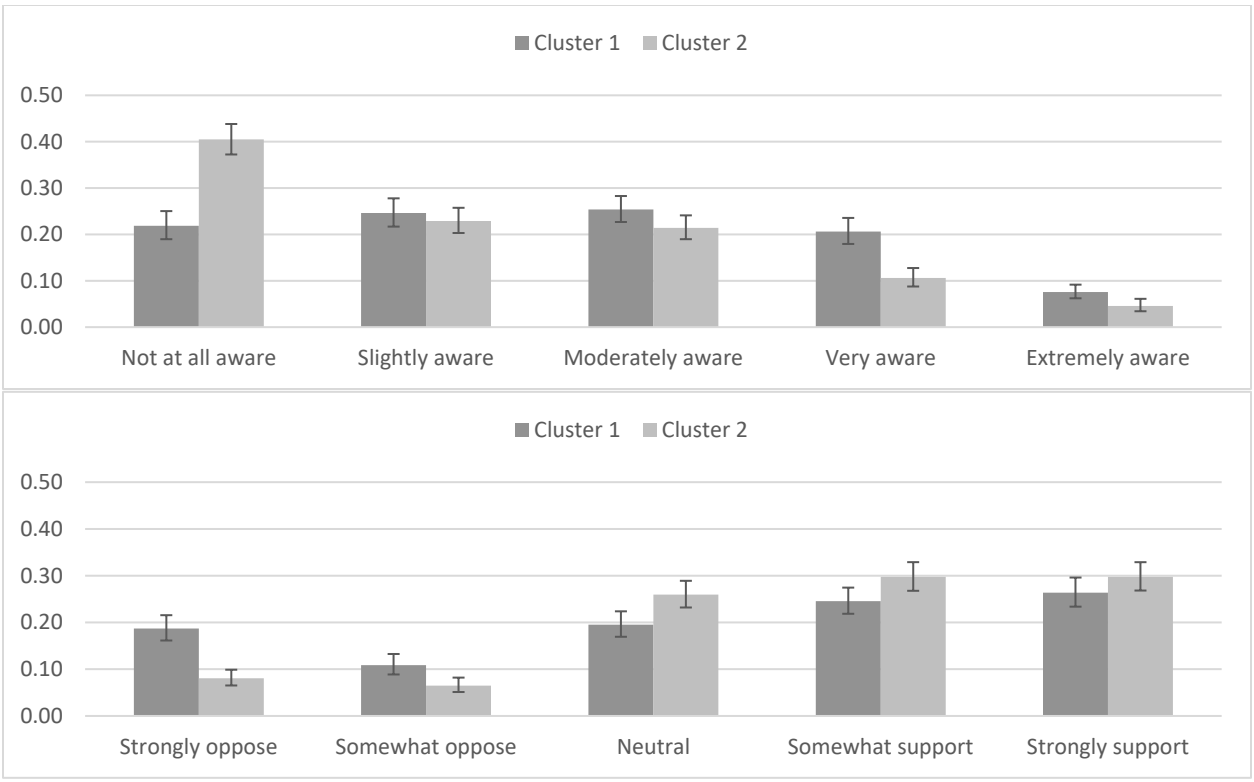

Figure 4: Awareness and support by cluster
Top: Awareness of offshore wind energy development by cluster
Bottom: Support for offshore wind energy development by cluster

Table 3 shows participation in past action types by cluster, as well as the likelihood of intending action within one's current city, county, or state based on past action within any city, county, or state one has lived. Residents of both clusters who strongly support or strongly oppose are more likely to intend action; however, residents of cluster 1 are also almost twice as likely to intend action ($t=8.60$, $p<0.01$) and about 1.5 times more likely to have engaged in past action related to offshore wind energy development ($t=3.89$, $p<0.01$). In particular, they are more likely to have signed a petition ($t=4.59$, $p<0.01$), contacted a public official ($t=3.18$, $p<0.01$), and attended public meetings sponsored by a government agency ($t=2.70$, $p<0.01$). The two clusters are equally likely to have joined an advocacy group ($t=1.50$, $p=0.13$), attended a public meeting sponsored by an advocacy group ($t=1.57$, $p=0.12$), and donated money ($t=0.43$, $p=0.67$).

Regardless of cluster, more study area residents intend action than have engaged in past action, and those who have engaged in past action are more likely to intend action than those who have not engaged in past action. Those in cluster 1 who have engaged in past action are almost 15 times as likely to intend action as those who have not engaged in past action, and those in cluster 2 who have engaged in past action are almost ten times as likely.

The likelihood of intending action varies by participation in past action types. For example, residents within cluster 1 who have signed a petition are 4.05 times more likely to intend action than not, but residents within cluster 2 who have signed a petition are about equally likely (1.14) to intend or not intend action. However, only residents within cluster 2 who have contacted a public official are significantly more likely to intend action than not ($t=1.97$, $p=0.05$), whereas, other than joining an advocacy group, all past

action participation has an increased likelihood of intending action within cluster 1 ($2.43<t<3.68$, $0.01<p<0.03$). Further, residents within cluster 1 who have contacted a public official are the most likely to intend action.

Table 3: Proportion of participation in past action by action type and cluster, and ratio of intended action to no intended action of those who have engaged in past action

Action	Proportion of Past Participation (Standard Error)		Ratio of Intended Action to No Intended Action (Standard Error)	
	Cluster 1	Cluster 2	Cluster 1	Cluster 2
Sign petition	0.15 (0.01)	0.08 (0.01)	4.0 (0.81)	1.14 (0.24)
Contact public official	0.09 (0.01)	0.05 (0.01)	7.67 (2.58)	2.35 (0.68)
Attend government meeting	0.08 (0.01)	0.04 (0.01)	4.63 (1.50)	1.66 (0.62)
Attend advocacy group meeting	0.06 (0.01)	0.04 (0.01)	5.75 (2.17)	1.53 (0.57)
Donate money	0.05 (0.01)	0.05 (0.01)	4.93 (1.61)	1.54 (0.58)
Join advocacy group	0.04 (0.01)	0.03 (0.01)	14.24 (7.08)	1.23 (0.55)

3.2 Perceived impacts

The two statistical clusters differ in responses to the quality of life importance-impact questions, summarized in Figure 5. The x-axis measures perceived impacts from offshore wind energy development, and the y-axis measures importance to quality of life. The x- and y-axes intersect at "no impact" and the average importance score for all twelve items for the two clusters; therefore, items on the left half are perceived to be negatively impacted, items on the right half are perceived to be positively impacted, items on the bottom half are relatively unimportant, and items on the top half are relatively important.

The most important items are marine mammal and sea turtle habitat for cluster 1 and local property values for cluster 2. The least important item for both groups is shipwrecks and other submerged maritime heritage sites. For both clusters, the item with the perceived greatest positive impact is job opportunities and the item with the perceived greatest negative impact is daytime ocean views. In general, cluster 1 residents tend to believe most of the targeted items will be negatively impacted by offshore wind energy, especially the ones they find relatively important. Alternatively, cluster 2 residents tend to believe more of the items will be positively impacted by offshore wind energy, especially the ones they find relatively important.

Key differences between the two groups include increased likelihood that cluster 2 finds job opportunities to be relatively important ($t=4.45$, $p<0.01$). Additionally, cluster 1 is more likely to believe local property values ($t=4.79$, $p<0.01$) and community image ($t=6.16$, $p<0.01$) will be negatively impacted by offshore wind energy, and cluster 2 is more likely to believe they will be positively impacted (local property values: $t=3.43$, $p<0.01$; community image: $t=3.18$, $p<0.01$). Cluster 1 residents tend to find most items more important than cluster 2 residents ($1.77<t<7.25$, $0.01<p<0.08$); although, cluster 2 residents tend to find

tax revenues (t=2.57, p=0.01), job opportunities (t=5.61, p<0.01), and electricity affordability (t=2.69, p<0.01) more important than cluster 1 residents and community image (t=1.60, p=0.11) and local property values (t=0.17, p=0.87) equally important. Cluster 2 residents tend to believe impacts will be more positive (or less negative) than cluster 1 residents for all items (1.67<t<5.61, 0.01<p<0.09) except for recreational fishing (t=0.92, p=0.09), which they find equally impacted.

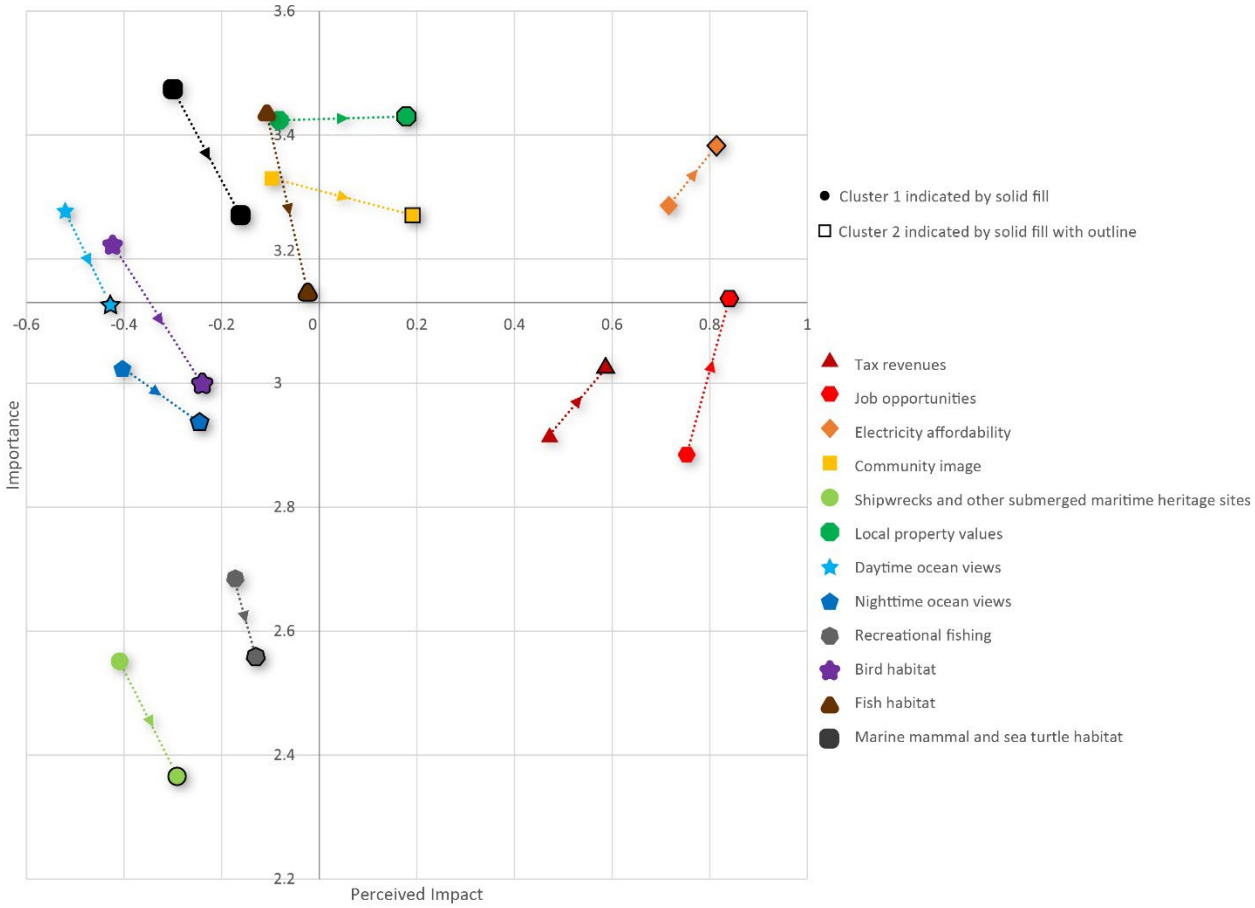

Figure 5: Perceived impacts by importance level for cluster 1 compared with cluster 2 (arrows pointing from cluster 1 to cluster 2) [color preferred]

One important caveat, regardless of cluster, is that residents are highly uncertain of these perceived impacts. Certainty rates range from about 62% to 76% for cluster 1 and 55% to 75% for cluster 2, and response rates tend to be slightly lower for items with greater uncertainty, which suggests some respondents did not provide an answer if they were uncertain. In general, residents seem more certain about impacts that could directly affect them, such as job opportunities and electricity affordability.

3.3 Place attachment

Principal components analysis was conducted to identify components of place attachment, resulting in two components. The first component, Personal Connection (alpha = 0.88), has positive associations with the biophysical and psychological dimensions, as well as one of the two political-economic items from Table 1. The second component, Social Connection (alpha=0.75), has positive associations with the sociocultural dimension, as well as the other political-economic item. The relatively large Chronbach's alpha values suggest reasonable internal consistency within the components.

The two statistical clusters differ by place attachment, where cluster 1 has greater personal ($t=5.58$, $p<0.01$) and social ($t=5.21$, $p<0.01$) connections than cluster 2.

4. Discussion

Along the Carolina coast, there are documented differences between spatial clusters, despite relatively low opposition throughout the region. Compared to cluster 2, cluster 1 is a smaller group, yet these residents are more likely to be aware of and neutral or opposed to offshore wind energy development within their own state, and more likely to have engaged in past social action as well as intend action regarding offshore wind energy. Cluster 1 is also more likely to hold higher place attachment and perceive more negative impacts from potential development. These findings prompt two key questions: Why is cluster 2 less engaged, and why is cluster 1 more opposed?[1]

Public activity level scholarship often uses the terms "vocal minority" and "silent majority" when describing differing levels of group participation, where the vocal minority refers to a small percentage (typically 5-10%) of users or stakeholders who disproportionately contribute the most content or who are more likely to participate in social action more frequently, while the silent majority refers to the larger percentage (typically 90-95%) of relatively inactive users or stakeholders who contribute or participate less frequently (e.g., [48,49,50]). Since the present analysis found a less striking split of approximately one-third and two-thirds, a modified naming convention will be used throughout the remainder of this paper, where the smaller, yet more active cluster 1 will be referred to as the "engaged minority," and the larger, yet relatively less active cluster 2 will be referred to as the "quiet majority."

4.1 Why is the quiet majority less engaged?

One plausible theory for explaining a relative lack of engagement by the quiet majority is related to their likelihood of being less oppositional. For example, the mobilization-minimization hypothesis [51], which theorizes that negative events are more likely to spur response than positive or neutral events, may be resulting in lower impetus to engage in action since these residents are more likely to be neutral or supportive. Similarly, a higher likelihood of support or neutrality may also imply that this population is unlikely to be spurred to action by moral shock [52] since these residents are unlikely to experience a sense of outrage from the proposition of wind energy development. However, the theory that engagement is primarily driven by opposition contrasts with existing regional research that found that strongly supportive and strongly opposed residents had similar odds of intending action related to offshore wind energy development, as did somewhat supportive and somewhat opposed residents [27]. Since supportive residents throughout the region are as likely to intend action as oppositional residents, why are a subset of those residents (the quiet majority) less likely to engage in past and future action? Possible explanations stem from levels of awareness, perceived opportunities, levels of place attachment, and impact perceptions, as well as more nuanced postulates of compounding barriers to social action, more generally, and disenfranchisement.

4.1.1 Awareness, opportunity, place attachment, and positive perceived impacts

The quiet majority is generally less aware of offshore wind energy development efforts within their own state, possibly resulting from offshore wind energy development in South Carolina being in earlier

[1] The inverse of each of these questions is equally interesting; however, the authors found that the theoretical rationale for these omitted questions was generally the opposite of the rationale presented for the included questions.

development stages at the time of data collection.[2] While knowledge is not a prerequisite to social action, awareness is typically the first step in intending action [34]. Therefore, this lower awareness could be driving their relative lack of participation, or may impact their associated awareness of social action opportunities. Earlier stages of development offshore South Carolina may have also presented fewer opportunities for residents of the quiet majority. Members of the quiet majority also tend to have lower levels of place attachment than the engaged minority, and they tend to believe most quality of life items (e.g., local property values, community image) will be positively impacted by offshore wind energy, especially the ones they find relatively important. Decreased place attachment or positive impact perceptions may also be influencing this cluster's engagement levels [51,19].

4.1.2 Compounding barriers to social action

In contrast to the engaged minority, the quiet majority may be time-constrained as these residents are more likely to be employed full-time and have children under the age of 18 living at home. As a result, quiet majority residents, both those opposed and supportive, likely have less availability during the workday [53], might feel that they lack the time necessary to participate, may prioritize their limited time differently than engaged minority residents [2], may prioritize other goals [54], or may experience conflicting sense of urgency [55]. These findings follow existing public participation patterns in community meetings related to natural resource management, where attendees are often older and wealthier than the population they are meant to represent [56,2]. The quiet majority is also more likely to be Hispanic, so language barriers to participation in social action may exist. Additionally, the quiet majority is less educated, less aware, and less certain of development impacts. Compounded, it is possible that these residents believe their opinions on offshore wind energy are not informed nor important enough to engage in social action. If true, this supports the notion of a 'knowledge gap' in which individuals of lower socioeconomic status typically have lower levels of policy-relevant knowledge when compared to those of higher socioeconomic status [57,58]. Impact uncertainty, coupled with other constraints, may also imply that their underlying beliefs on the issue are not strong enough to warrant mobilization [59].

4.1.3 Disenfranchisement

Quiet majority residents may also be hesitant or disinterested to engage directly with government siting and leasing processes due to feelings of disenfranchisement or lack of power. Wolf [60] suggested that some subpopulations may not participate in democratic processes because feel they have been labeled as powerless or undeserving. Inaction by 'non-activists' has long been linked to feelings of powerlessness by activism scholars [61,62]. Inequality and social vulnerability are likely to increase the notion that affected citizens do not have an effective voice in democratic processes [63,64]. As quiet majority residents are more likely to be a minority race or ethnicity (non-White or Hispanic), less educated, and less affluent, similar levels of disenfranchisement may be impacting the present study's quiet majority.

Other studies (e.g., [64]) have suggested that many citizens are no longer engaging in traditional forms of democratic participation such as voting in elections, because those forms fail to elicit their intended response. In the context of voting, research has further suggested that elected officials are most responsive to the preferences of society's most affluent subpopulations, resulting in the assumption that participation from quiet, non-affluent citizens would not impact the outcome [63,65]. This may explain why, in the present research, contacting a public official is one of the most popular types of past action

[2] At the time of data collection in 2018, there were four larger call areas offshore South Carolina, but two active wind energy areas and one lease area offshore North Carolina.

for engaged minority residents and has the greatest impact on their intended action. In comparison, quiet majority residents are less likely to have engaged in past action related to the government (i.e., contacting a public official or attending meetings sponsored by a government agency) than engaged minority residents; however, those who have previously contacted a public official are the most likely to intend action.

It is also possible that this construct is self-fulfilling. Stakeholder theory reasons that high stakeholder salience, in which individuals are most likely to have their voices heard, is based on high levels of stakeholders' power to influence the planning process, the perceived legitimacy of their demands, and the urgency of their claims [66]. In the context of coastal management, Buanes et al. [67] maintained this theory and argued that stakeholders who have lower levels of these three contributing factors have a higher chance of being ignored by planners. Stakeholder latency is further supported by Wolf's [60] supposition that while groups labeled as powerful and deserving receive the message that their participation is welcomed, those labeled as powerless and undeserving receive the opposite messaging. Effectively, this suggests that the more a stakeholder group feels disenfranchised, the more likely they are to feel or be ignored while participating, which may discourage them from participating in future processes, thereby increasing their underlying disenfranchisement.

4.2 Why is the engaged minority more opposed?

Many factors may be influencing increased opposition within the engaged minority, but one explanation may be perceived lack of fairness in the development process. Firestone et al. [32] found the more a person perceives positive process transparency, process fairness, and local input in decision-making, the more likely they are to move from opposed to undecided to supportive. Other studies have also found that perceived fairness of decision-making processes and trust in agents responsible for development increased the likelihood of public acceptance and support of wind energy [68,69]. To mitigate these effects, Dwyer and Bidwell [70] suggested that process leaders should first build trust in themselves, then in the process itself, and lastly in the project outcome.

This explanation may also relate to perceptions of adverse impacts from offshore wind energy development. The engaged minority appears to be more certain of the potential impacts of offshore wind energy development and is more likely to believe that most of the quality of life items will be negatively impacted. Spatially, this cluster is more likely to live closer to the coast, which may influence its belief that local property values and community image will be negatively impacted. This cluster also exhibits more place attachment than the quiet majority, which is likely amplifying its concerns. This supports Devine-Wright and Howes' [26] and Gonyo et al.'s [27] findings that those with strong place attachment were more likely to engage in place-protective behaviors in regard to offshore wind energy development. Devine-Wright and Howes [26] also found that the influence of place attachment on support level was mitigated by trust in the developer. This suggests that if engaged minority residents are opposed to offshore wind energy development due to their strong place attachment, the influence of place attachment could be alleviated through improved trust between residents and wind energy developers.

This cluster is also likely to be older, less racially diverse, more educated, and more affluent. This is consistent with previous studies that found correlations between older populations and opposition to renewable energy [71,72,73], and between wealthier populations and opposition to offshore wind energy [73]. However, it contrasts with Carlisle et al.'s [74] finding that White populations were more likely to support solar energy. It also contrasts with studies that found correlations between higher educational

attainment and support for government policies that promote renewable energy [71,72,73], with one caveat: Hamilton et al. [71] also found more educated (but politically conservative) respondents to be more opposed.

5. Conclusions

Public engagement is a critical component of energy development processes because it enables communication between local communities and government agencies responsible for energy generation solutions. In the U.S., where offshore wind energy development is relatively new, agencies often use public engagement activities such as public notices, solicitation of public comment, and informational meetings to collect public opinion, identify perceived negative impacts, and inform mitigation strategies. The spatial differences observed in this study suggest that traditional public engagement activities may be more likely to elicit social action from subsets of coastal populations, suggesting an inherent unlikelihood to capture representative understandings of public opinion. This study offers three potential areas for improving offshore wind energy development processes related to social action and representation in civic engagement: 1) encouragement of non-active oppositional residents in order to better address their concerns, 2) identification and encouragement of supportive residents as allies to local renewable energy development efforts, and 3) better mitigation of active oppositional resident opinions.

First, the opinions of oppositional residents who have been inactive are not only excluded from early agency efforts to actively mitigate concerns, but they also pose a potential threat to the success of development processes if these residents choose to engage later in the process. While federal agencies cannot be expected to engage all residents, nor should they expect all residents to willingly participate in social action, agencies may be interested in encouraging increased participation in certain social action activities (such as public meetings) by a wider array of stakeholders to understand additional oppositional opinions. Better advertisement for public meeting opportunities, expanded informational campaigns to increase awareness of offshore wind energy possibilities, or incorporation of virtual engagement methods that require less time or effort by participants may result in increased participation and representation.

Second, the identification of supportive residents on the Carolina coast and elsewhere presents a unique opportunity for federal agencies responsible for renewable energy development. While 60% of residents within the quiet majority and 51% of residents within the engaged minority are supportive of offshore wind energy development within their own state, only 23% and 43% intend action in each of the respective clusters. Federal agencies may consider targeted education and outreach materials to foster relationships with supportive residents. Another approach may involve leveraging existing social networks to identify and encourage allied relationships [52]. For example, given the high value and perceived impacts placed on job opportunities by the quiet majority, federal agencies or offshore wind energy developers (as appropriate) may be able to build relationships with labor unions involved in or considering the transition to clean energy generation. Selvanathan et al. [75] proposed that involving allies in social change efforts can confront inequality, serve as role models, and influence social norms. This, in turn, may have the potential to promote acceptance and empowerment among members of broader society. In the context of offshore wind energy development, this may encourage renewable energy transitions through active energy citizenship [76,77].

Third, early identification of active oppositional resident opinions can further improve renewable energy development processes. As demonstrated by the outcome of the Cape Wind project [23,78], oppositional

stakeholders have the ability to effectively mobilize and postpone or eliminate an unwanted development effort, especially when supported by affluent members of society. This, in and of itself, is not inherently bad—residents often have valid concerns related to energy development projects [3] and policy makers should be careful not to label oppositional residents and dismiss their opinions [60]—however, early understanding of these concerns can save valuable time and resources as well as provide earlier opportunities for mitigation or compromise. Further, if oppositional views are held by only a small fraction of the public, mobilized efforts may prevent a project supported by the majority of the community. Changes to the development process might include increased process transparency and process fairness, local input in decision making, and improved trust in the developers. For example, in contrast to Cape Wind, increased perceptions of process fairness contributed to the acceptance and operation of the Block Island Wind development offshore Rhode Island [69].

Each of these three areas for improvement underscore the potential benefits of increased representation and public engagement in local energy development processes. Current processes may be improved by the introduction of alternative information gathering sessions (e.g., deliberate mini-publics [79,80], online tools, digital meetings [81]), shifts in permitting process authorities (e.g., federal or state retention of ultimate permitting authority but increased support for local-level deliberations [82], intergovernmental projects), or co-production of energy technologies and landscapes [83] (e.g., renewable energy cooperative membership [84], community wind energy projects [85], community benefit agreements [2]); though each of these approaches is not without its challenges (e.g., [81,86,87,88]). For Carolina coast residents, signing petitions has been the most frequent type of social action, but has had the least likelihood of resulting in intended action. Instead, policy makers may benefit from involving engaged minority residents who have contacted a public official or attended a meeting sponsored by an advocacy group in offshore planning processes, as these individuals are especially likely to intend action. Quiet majority residents who have previously engaged in action should not be overlooked, however, since these individuals are still almost ten times more likely to intend action than quiet majority residents who have not previously engaged in action. Due to the relative size difference between the clusters, slightly more than half of those who intend action are from the quiet majority, further demonstrating the need to include these residents in engagement efforts. Specifically, quiet majority residents who have contacted a public official are most likely to intend action. These place-based findings suggest that social science research efforts may also be a valuable tool to supplement traditional engagement efforts if conducted at early stages of offshore wind energy development.

This research offers an enhanced understanding of the spatial nuances of social action related to offshore wind energy. The lack of spatial uniformity on the Carolina coast suggests there are likely to be differences related to awareness, support level, and past and intended engagement in social action among subpopulations for any proposed energy development project. There are also variations in perceptions of impacts underlying resident understanding of offshore wind energy development efforts, perceived importance and certainty of those impacts, levels of place attachment to the Carolina coast, and demographic characteristics. This heterogeneity implies that a uniform or traditional approach to public engagement efforts related to energy development may be less effective in obtaining representative understandings of public opinion and reducing drivers of opposition mobilization compared to a multi-faceted public engagement initiative. More reflective spatial and demographic representation within social action opportunities is likely to more accurately reflect the needs and preferences of communities

related to energy generation solutions. While the results of this study are specific to the Carolinas, this research has broader implications for energy development planning processes in the U.S. and abroad.

6. Limitations and Future Research

This paper builds upon research that has examined drivers of social action more generally to advance the scientific understanding of the motivations for intended action for or against localized offshore wind energy development, but is not without its limitations. Each state was considered "local" relative to its own residents and compared to the other state and a national context. Respondents were not shown proposed or potential locations for offshore wind development efforts within the survey. Future studies might define local as physically proximate to a specific, proposed offshore wind energy development area or even a proposed project.

This study was also limited by its sampling design, which prioritized distance from the shoreline in a series of distance bands. The chosen geographies resulted in few non-White non-Hispanic individuals within the sampling frame. The chosen survey mode (self-administered paper and pencil) likely also contributed to an older sample. Future surveys could explore modifications to the sampling design and a mixed-mode approach, as well as larger sample sizes for exploration of nuanced subpopulations and refined spatial clusters that could provide more targeted information.

Finally, to reduce respondent burden, not every topic of interest could be included in the survey. For example, volume or frequency of monetary donations (as opposed to the binary asked) would have allowed for further examination and interpretation of fiscal restraints. Similarly, frequency of past engagement would have allowed for a comparison of residents who regularly engage in public forums and meetings compared with residents who rarely or never engage, providing further actionable context for public officials leading energy development efforts. The broad definition of social action activities to include participation in demonstrations but also passive attendance at public meetings enabled wide understanding of engagement across study area respondents, but complicated the nuances of intended action for policy makers. Past action types were also used to imply future trends, despite not collecting future action types directly. Future research could collect stated motivations and barriers to action, such as lack of time, lack of funds, or language barriers, as these are likely to better predict future engagement outcomes. Further, collection of political affiliation or environmental ideology may provide more context for support level, associated engagement levels, and types of action taken. Future studies could also explore different types of respondent place attachment in addition to the degree of generalized place attachment to assess potential differences between permanent and seasonal populations. Lastly, while many studies have explored procedural fairness and trust as they relate to local support for wind energy projects, additional research could better link perceptions of fairness and trust directly to engagement or intended engagement in social action. Perceptions of fairness and trust could also be explored via perceived credibility of information sources throughout the offshore wind energy development process, from siting, leasing, construction, and commissioning to the operations phase.

7. Acknowledgements

We kindly thank the comments from three anonymous reviewers, as well as from Dr. Terry McTigue and Dr. Chris Ellis (National Oceanic and Atmospheric Administration), Dr. Lauren Knapp (Lynker, Inc.), and Dr. Dianne Rogers (Northern Illinois University). We also thank Dr. Trent Buskirk (Bowling Green State University) for statistical consultation, Heidi Burkart (CSS, Inc.) for her research support and Seann Regan (CSS, Inc.) for his assistance with figure design. This study relied upon research supported by the U.S.

Department of the Interior Bureau of Ocean Energy Management through an Interagency Agreement with the U.S. Department of Commerce National Oceanic and Atmospheric Administration, and we thank all who contributed to that research effort and its resulting publications.

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