

Decoding the Motivations of Fishers Considering Participation in Citizen Science Projects

This proposal responds to a call for research from the South Atlantic Fisheries Management Council (SAFMC). SAFMC desires researchers to “study and document the interests, motivations, and concerns of fishermen who might participate in the SAFMC’s growing Citizen Science Program” The South Atlantic region is distinctive in its efforts to build a citizen science framework to guide future projects in the region, which offers a unique opportunity to systematically assess possible collaboration in the region.

We address this information need by combining (1) a qualitative interview-based research strategy that provides an in-depth understanding of fisher’s motivations and experiences with (2) a tailored sampling and robust recruitment strategy to ensure representative data gathering. This will result in us delivering a nuanced analysis of fishers’ reasoning surrounding their decision to participate in SAFMC citizen science efforts.

STUDY CONTEXT

The 2006 Magnuson-Stevens Act revisions placed stringent requirements on regional Fishery Management Councils to ensure that no fish stocks in federal waters be undergoing overfishing, and that all overfished stocks be under an active stock rebuilding plan (Crosson 2013). This mandate resulted in more extensive regulation of commercial and recreational fishing than had been previously experienced. In the South Atlantic, the species requiring the most regulation are cultural and economic touchstones of the region: the snapper/grouper complex and mackerels¹.

Fishery management depends on fishery and ecosystem data. As individuals regularly engaged with the ecosystem, fishers have important knowledge and insights. Also, they may be able to routinely collect fundamental data. However, information sharing requires trust between all parties involved (Bonney et al, 2021). Within fisheries management, Yandle et al. (2011) found that industry members with moderate levels of trust have the highest levels participation in fisheries management; and institutional trust is not monolithic, with fishers' trust varying by institution (Yandle et al, 2011, Grey et al., 2012) and institutional trust and participation varying by institutional scale (Yandle, Tookes, and Grace-McCaskey 2020). The role of trust in fisheries management is an under-studied topic, and the relationship between trust in management and impact on citizen science efforts is limited (Bonney et al 2021).

To address the intersection of these barriers and opportunities, this project uses two contrasting fisheries as lenses into fisher trust in science and management, motivations for engagement, and barriers to participation in citizen science. This information is elucidated via in-depth, semi-structured qualitative interviews in order to provide the most culturally relevant, methodologically sound information about fisher perspectives on these topics.

METHODOLOGY TAILORED FOR THE SOUTH ATLANTIC

Fisheries in the SAFMC region are complex—both biologically and socially. Providing accurate analysis of fishers’ decision-making about whether to participate in citizen science, on a tight budget, requires a carefully targeted in-depth research strategy such as the one we are proposing.

A robust sampling frame enables representative voices

Our goal is to gather information from a representative sample of the fishing population. The geographic, economic, racial, ethnic, and cultural diversity of fishers in the SAFMC region is evident, but not quantified at the population level. Thus, we cannot sample based on available demographic data. Instead, we propose randomized sampling of individuals who meet the criteria for our sampling frame based on fishery, sector, and geographic segments.

¹ The snapper/grouper complex contains numerous species, and both commercial and for-hire permits cover the entire complex. Mackerels have commercial permits for King Mackerel and Spanish Mackerel separately, while the for-hire sector Coastal Migratory Pelagic permits cover King and Spanish Mackerel as well as Cobia. While we acknowledge and understand these distinctions, we will use the terms "snapper/grouper" and "mackerels" throughout this proposal for brevity.

Two fisheries are selected to provide maximum comparative analytical leverage

We propose an in-depth comparative analysis to two contrasting SAFMC fisheries. By analyzing fisheries with contrasting conditions, we will be able to tease out how fishery conditions influence fisher behavior and decision-making. To maximize our comparative analytical power, we propose focusing on two culturally significant fisheries with contrasting conditions:

- The Snapper/Grouper complex is a vast complex that incorporates many species. There is strong competition between sectors, and most species are under heavy catching pressure, with many listed as overfished or experiencing overfishing. Management decisions are often contested, and there are fisher concerns over catch limit reductions and possible closures.
- The migratory pelagic King Mackerel fishery also has engagement from all sectors, but is neither over-fished nor experiencing overfishing and is broadly considered a healthy fishery. There is some camaraderie and collaboration among its members who have proactively approached managers seeking additional regulatory protection for the species.

Three sectors are represented in sampling

Three distinct sectors (commercial, for hire, and angler) are represented in most SAFMC-managed fisheries. Thus, we purposefully include all three in our sampling.

Commercial and For-Hire sectors: Comprehensive information about the population of these sectors (registered permit holders) is available in the NOAA Database of [All Southeast Regional Office Vessel Permits](#). We refined the database to focus on those with clearest ties to the region:

License holders with addresses outside the four-state region were eliminated, as were permits held by corporations or businesses without addresses.² Applying these restrictions to the two selected fisheries, we derive the populations in Table 1.

Table 1: Eligible Population by Sector

	Snapper/ Groupers	Mackerels
Commercial Fishers	536	1237
For-Hire Fishers	1664	1635

Angler Sector: The angler (individual recreational fisher) sector lacks comprehensive Federal licensing. Furthermore, a relatively high number of anglers may only participate once every few years. Thus, determining the population of resident anglers is difficult. We propose to focus on resident anglers with a “demonstrated sustained interest in recreational fishing, which we define as being a member of a local organization focused on recreational fishing. Examples of eligible anglers include:

- Members of fishing clubs recognized by the [International Gamefish Association](#)
- Members of local chapters of the [Coastal Conservation Association](#), which is recognized as a significant voice for recreational fishers in the Southeastern US
- Members of [other identified saltwater angler clubs](#)

Four geographic segments provide a diversity of voices across the region’s fishing communities

To identify the communities most engaged with our targeted fisheries, we used data on top landings in both Commercial and For-Hire sectors by community in the publicly available NOAA’s “[Snapshots of Human Communities](#)”. We reviewed all Florida communities, and removed those that were oriented towards the Gulf. Then we evaluated the top landings in each community to assess whether these communities have a particularly strong relationship with the targeted fisheries. Finally we divided to these communities into four segments, in which towns and ports with geographic and fishing affinities are grouped together in Figure 1. These segments better align with fishing community structure than a simple division by state. Correspondence between these geographic segments and target fisheries are summarized in Table 2.

Figure 1: Research region separated into geographic study segments



² These “out of region” or “lack of” addresses indicated more complexity in license-holder identity, which would decrease probability of accessing permit-holders with relevant perspectives and opinions.

Table 2: Geographic segments for citizen science study

Community	Grouper	Snapper	Jacks	Spanish Mackerel	King Mackerel
Segment 1: Wrightsville Beach, NC to Savannah, GA					
Wilmington, NC	X			X	X
Wrightsville Beach, NC	X	X		X	X
Carolina Beach, NC	X	X			
Oak Island, NC	X	X	X		X
Southport, NC	X	X	X		X
Murells Inlet, SC	X	X	X		
Little River, SC	X	X	X		
Segment 2: Brunswick, GA to New Smyrna Beach, FL					
Savannah, GA				X	X
Brunswick, GA				X	X
St. Augustine, FL	X	X	X		
Port Orange, FL					X
New Smyrna Beach, FL	X	X	X		X
Segment 3: Ft. Pierce, FL to Miami, FL					
Fort Pierce, FL				X	X
Palm Beach Shores, FL	X	X			
West Palm Beach, FL	X			X	X
Boynton Beach, FL	X			X	X
Hialeah, FL	X	X	X		X
Miami, FL	X		X	X	X
Segment 4: Homestead, FL to Key West, FL					
Homestead, FL	X	X			
Key Largo, FL	X	X	X		
Islamorada, FL	X	X	X		X
Marathon, FL	X			X	X
Cudjoe Key, FL	X	X			X
Key West, FL	X	X			X

For each population in Table 2 we are systematically randomizing participant selection to avoid bias in selection. Given the unknown demographic characteristics of the populations, randomized recruitment offers all members of the population an equal chance of participating in the research. This enhances diversity compared to strategies such as snowball sampling or convenience sampling.

Recruitment of commercial and for-hire fishers

For each geographic segment we will identify all federal permit-holders in both sectors. These populations will be listed in a database, then each list will be randomized. The researchers will begin personalized, targeted recruitment in each population in order to solicit study participants. First an invitation postcard will be sent to the home address for the targeted permit-holders, and phone numbers will be sought using online sources. Potential participants who do not respond after two postcards and phone calls, or decline participation, will be removed from the database, and the researchers will move to the next set of names on the randomized list.

Recruitment for recreational fishers (anglers)

For each geographic segment, fishing organizations in the relevant communities will be approached with a request to recruit for the study using their membership rolls. Depending on the organization's preference, this may take a variety of forms such as: the research team directly emailing members, an announcement of study included in regular organization communications, a posting in organization social media, or other similar outreach. For each geographic segment, potential participants will be pooled and randomly selected for interviews until the goals for the sampling frame are met.

Sampling goals support representation across sectors and geographic segments

For each geographic segment and fishery sector, we established goals for the number of interviews that will be conducted. This segmentation supports efforts to ensure that sampling is representative and increases the probability of achieving meaningful diversity (see Table 3).

Table 3: Summary of sampling goals

Geographic Segment & Fishery Sector	Commercial	Charter	Angler
<i>Segment 1</i>	3-5	3-5	3-5
<i>Segment 2</i>	3-5	3-5	3-5
<i>Segment 3</i>	3-5	3-5	3-5
<i>Segment 4</i>	3-5	3-5	3-5
Target Study Sample	12-20	12-20	12-20

Participants will be offered several options for participating in interviews

In-depth qualitative interviews (described in more detail below) will take place in one of several modalities. Participants in all sectors in each region will be offered a choice of the three options so they can choose the one that best fits with their own schedule and lifestyle, and will be offered financial incentive (gift card) to participate in the interview. A unique strength of our dual-hemisphere research team is that a researcher is available for an interview at nearly every hour of the day and night, which allows us to better accommodate our participants and their schedules.

1. Telephone Interviews: Participants will be offered a variety of potential interview times, including evenings and weekends. The strength of this modality is participant ease with the technology, and experience and comfort level common with telephone communications. This modality can most easily fit into fisher lifestyles, as they can participate in the interview from any location at any time.
2. Video Interviews: Participants will be offered a variety of potential interview times, including evenings and weekends. This video option is preferable to the phone option, as it allows the researcher to evaluate body language during the interview, and adjust questions appropriately.
3. In-Person Interviews: These will be scheduled with the researchers on specified dates when they will be in the region. This option is most preferable for human subjects research because it allows for a better assessment of participant engagement and emotional reaction as well as the ability to adjust questions in accordance with participant non-verbal communication. This modality is the most comfortable for people who do not regularly engage with or have comfort using technology. Our research experience in the region has also demonstrated that in-person interviews result in the highest quality and largest quantity of human subjects data. The only weakness of this method is the limited dates that can be offered to the participant because of travel limitations.

Our experienced team offers proven research instruments

We propose to use semi-structured, ethnographic interviews to gather qualitative data about fisher trust in science and management, motivations for engagement, and barriers to participation in citizen science. Qualitative interviews allow for a deep understanding of the research topic, encapsulate the lived experience of these individuals, and reveal how their lifetimes are shaped by federal regulations. These will be semi-structured, open-ended interviews to allow for new information to emerge, but also follow a general script in order to cover a list of desired topics (Bernard 2006, 210).

Our research team has conducted extensive research with fishing communities on themes discussed in this RFP (attitudes to and willingness to work with management and fishery conditions).³ In addition, our research team has conducted research on the closely related themes of trust, well-being, and social networks, which are relevant to understanding fishers' decision-making on whether to participate in citizen science (Tookes, Yandle, and Fluech 2022; Yandle, Tookes, and Grace-McCaskey 2020). We will draw on interview guides used in previous projects and develop additional questions on fishers' comfort levels on sharing various types of information, and circumstances under which they may be willing to participate. However, we prioritize collaboration, and would welcome cooperation with the funders and associated researchers as we craft these instruments and conduct this research.

An in-depth interview-based approach best illuminates motivation

It is appealing to cast a wide net over a massive potential study population to obtain a survey with a high sample size. This approach supports coverage across a large number of people and provides simple, easily interpreted findings. Indeed, typical closed-ended question surveys (e.g., ranking, Likert, multiple choice) are excellent tools for understanding *what* people do. However, the limiting nature of closed-ended questions means high volume surveys have limited utility for understanding *why* people make specific choices. By necessity, the construction of survey questions limits respondents to what the researchers pre-suppose are the most likely answers. They also provide limited or no opportunity for respondents to explain their answers. For a study focused on *why* people choose to participate (or not participate) in citizen science, individual qualitative interviews that provide ample opportunity for participants to discuss the complexity of their decision-making, followed by thematic analysis to determine key barriers, and motivations is the best strategy to meaningfully answer the research question.

Inductive data analysis based on grounded theory provides accurate nuanced findings

The proposed qualitative research approach is based on grounded theory (Glaser and Strauss 1967), which relies on inductively developed understandings that emerge during the course of a study. These themes are in constant interaction with the emerging data, allowing continual revision. In contrast to conceptually developed theory that is simply tested, grounded theory is rooted in the data from the given study, and thus more accurate.

Data analysis for this project will commence with transcription, review, and coding of interview transcripts. The researchers will identify themes, patterns, and variations in the data. Once recurring ideas begin to emerge, open coding (Emerson et al. 2011) will be used to identify analytic categories and predominant themes. These themes will illustrate the foundational data incorporated into the reports and manuscripts and will provide nuanced insights into the opportunities and barriers to participation in citizen science, and prospects for increasing fisher participation in the region. The final product of this project will be a report containing all findings, however, the research team would also like to collaborate with the funders to disseminate results more broadly.

CONCLUSION

Fishers across the South Atlantic are generally a population that is not readily or easily accessible. As a result, research may unintentionally over-sample and over-represent (1) participants who are involved in management to some degree, (2) fishers who are sufficiently financially and socially stable enough to take time away from their livelihoods to respond to public calls for participation in citizen science, and/or (3) fishers who fall within the social and economic networks of these two groups. By using randomized, purposive sampling within two contrasting fisheries, across all three sectors, and within four geographic segments, we are diversifying the voices represented in the research informing decisions about citizen science in management. As established social scientists in the region, we are able to rely on existing networks, proven research instruments and findings, and long-term cultural fluency with the people in the South Atlantic to identify the obstacles and opportunities relating to fisher involvement in citizen science.

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Decoding the Motivations of Fishers Considering Participation in Citizen Science Projects Timeline

Jennifer Sweeney Tookes, Tracy Yandle, & Bryan Fluech

Task	2023										2024				
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Create interview guides & obtain IRB approval															
Refine sampling frame & target participants															
Contact recreational organizations for collaboration															
Research travel and interview engagement															
Interview transcription & preliminary data analysis															
Data analysis & refinement															
Writing of reports and disseminating findings															

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