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An Overview of the Survey on the Socioeconomic Aspects of Commercial Fishing Vessel Owners in the Northeast and Mid-Atlantic

US DEPARTMENT OF COMMERCE
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An Overview of the Survey on the Socioeconomic Aspects of Commercial Fishing Vessel Owners in the Northeast and Mid-Atlantic

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1. INTRODUCTION

The design and implementation of the "Survey on the Socioeconomic Aspects of Commercial Fishing Vessel Owners in the New England and Mid-Atlantic," referred to here as Owner Survey, was part of several new and ongoing data collection efforts to support social science research on the region's fisheries.[1] Surveys were mailed to 1,400 vessel owners on September 13, 2013. The survey was closed on January 13, 2014 with 160 (141 by mail and 19 online) completed surveys, 10 partially completed, and 6 returned as out of scope as indicated by note via mail, phone call, email, or direct contact with the Social Sciences Branch (SSB) placing the response rate at roughly 11%. This document provides an overview of the survey's development, its implementation, and basic statistical summaries of the questions asked. A companion survey of fishing crew, the "Survey on the Socioeconomic Aspects of Commercial Fishing Crew in the Northeast and Mid-Atlantic" (Crew Survey), was implemented approximately one year prior to the Owner Survey and was documented in a technical memorandum published in September 2014 (Henry and Olson 2014).

2. BACKGROUND

The Social Sciences Branch (SSB) of the NOAA Fisheries Northeast Fisheries Science Center (NEFSC) began developing the crew and owner surveys in 2010 to address gaps in the social and economic performance measures of regional fisheries. These performance measures were developed by SSB staff after an extensive literature review and were refined through communication with industry, policy, and academic stakeholders (Clay et al. 2014). One of the most important goals of the performance measures was to track trends over time and across fisheries in order to provide enhanced analysis of the social and economic impacts of regulations and to compare outcomes of differing regulatory strategies. SSB staff identified 5 primary components of fishery performance—(1) financial viability, (2) distributional outcomes, (3) stewardship, (4) governance, and (5) well-being. Indicators of these performance components were developed by using existing data and the development of new data collection (Clay et al. 2014).

NEFSC has collected biological data for many years, stretching back a century in some instances (Fogarty 1995; Skud 1982; Lange and Palmer 1983; NOAA 1988). Comparable systematic social and economic data collection efforts have been lacking, however, including even the collection of basic demographic information about fishery participants and stakeholders. Both the crew and the owner surveys were developed with the intention of continuing on a regular basis in order to facilitate longitudinal and time-series trend analyses of the socioeconomic aspects of fisheries within the region. The first iteration of this survey comprised a lengthy set of questions and was divided into 2 partially overlapping versions. The rationale for keeping many questions in the survey rested on the expectation to conduct principal component analysis in order to determine the explanatory power of each item for each of the different performance measures featured throughout the survey. This information would be used in any future survey efforts to design a single, shorter, and more effective survey instrument.

[1] Copies of both versions of the socioeconomic survey of vessel owners can be found on the NEFSC SSB Owner Survey webpage (accessed June 8, 2017).

3. METHODS

3a. Survey Instrument Development

The development of the survey instrument for the owner survey drew upon other surveys that had been pretested on smaller samples of regional fishermen, including the SSB's "Social and Economic Survey" administered as part of the Federal Disaster Relief Assistance Program for groundfishermen in 2000 (Olson and Clay 2001), the social capital survey of regional groundfishermen conducted in 2010 (Holland et al. 2010), and the regional job satisfaction and well-being survey (Pollnac et al. 2015). The majority of survey items in the current survey were conceptually linked to at least 1 of the 5 performance measures previously noted in Section 2. Other questions covered basic demographic information about respondents, including questions about the respondents' primary ports and fisheries. This survey may simultaneously support the analysis of the performance of specific fisheries, allow for the tracking of demographic composition of the fishing industry over time, and enhance the analysis in future Social Impact Assessments for Fishery Management Plans. Below are the general descriptions of the series of items for each of the performance measures.

Questions directed at financial viability consisted of items assessing dependence on income from fishing activities (Q7-8), family involvement in any aspect of the industry (Q9-16), and commercial fishing vessel ownership (Q4-6).[2] These questions were meant to supplement some of the items asked in the cost surveys referenced above (Das 2013a, 2013b) by focusing on household economic circumstance, as well as the specific experiences of vessel owners. If the survey is replicated in the future, those data will make it possible to track the potential changes in family involvement in fishing, a variable shown to have also had impacts on distributional outcomes and well-being overall (Clark 1988; Danowski 1980; Dixon et al. 1984; Doeringer et al. 1986; Miller and Van Maanen 1982).

Survey items aimed at assessing distributional outcomes consisted of the payment system used on respondents' vessels (Q20-21); whether respondents' vessels were owner-operated or captained (Q22-23); and the size of the crew, length of their employment, amount of new hires, and satisfaction with their performance on the job (Q25-27). Labor arrangements have been shown to be key markers of social relations in a fishery, which often change in response to particular regulations and result in distributional consequences (Bradshaw 2004; Brandt and Ding 2008; Eythórsson 1996; Guyader and Thébaud 2001; McCay et al. 1995; Pinkerton and Edwards 2009).

The concept of stewardship was captured by questions about levels of bycatch, discards, and high-grading (Q36-37), as well as attitudes about fishing and the natural environment (Q40). While prior research has not found a strong connection between catch shares and stewardship behaviors (Costello et al. 2008; Essington et al. 2012; Gilmour et al. 2012), perceptions about the health of the resource indicate the kinds of conditions that fishermen experience while on the water (Biggs et al. 2010) and can relate to the perceived adequacy and efficacy of regulations (Pinkerton and John 2008).

Items related to governance include participation in fisheries management (Q39); trust and fairness in the decision-making process (V2 Q33 and V2 Q35); effectiveness, ease of compliance, and clarity of regulations (Q41); and finally the goals and outcomes of management policies (Q43, V2 Q34, and V2 Q37). Prior research has indicated that the ability to participate in

[2] The numbering reflects version 1 of the survey, unless otherwise noted.

management decisions in a meaningful way is important to perceptions of the legitimacy of the regulatory process and can also enhance the effectiveness of management so that decisions better match conditions (Bodin and Crona 2009; Jentoft et al. 1998; Jones 2010; Pinkerton 1989; Pretty and Smith 2004; Pretty and Ward 2001; Wiber et al. 2004; Yochum et al. 2011). Greater trust in government among recreational fishermen has been shown to influence beliefs about the effectiveness and necessity of regulations, such that recreational fishermen with greater trust are more likely to believe that the regulations were necessary and effective than those who did not trust government or regulatory institutions as much (Gray et al 2012).

Questions related to well-being include attitudes towards fishing as a livelihood (Q45-47), job satisfaction (Q44 and V2 Q42), and boat and health insurance coverage as an indicator of social vulnerability (Q52-61). These items are aimed at assessing other aspects of well-being that participants derive from their occupation aside from their personal incomes (Pollnac et al. 2006).

3b. Implementation

The initial intent of this survey was to gather data to inform the development of social indicators that fall under the broad SSB performance measures of financial viability, distributional outcomes, governance, stewardship, and well-being. Survey packets were mailed to vessel owners via US mail. Vessel owners could return the survey via an addressed, postage-paid envelope in hard copy or complete the survey online at a secured website. Each survey packet contained a unique username and password. At the time the survey sample was drawn, there was a population of 4,062 commercial fishing vessel owners in New England and the Mid-Atlantic states. Each vessel was binned into different primary fisheries based on its portfolio of assigned permits assigned and the vessel's landings history over the period of 2009-2012. Vessel owners were sampled proportionate to the population by primary fishery. It is important to note that the vessel owners sampled were only those who were the vessel owners in 2012 and could have been different from the owners who owned the sampled vessels in 2009, 2010, or 2011 because ownership may have changed hands over that period of time.

The survey was administered by the Eastern Research Group (ERG). ERG conducted 6 rounds of pre-tests with commercial fishing vessel owners in late 2012 through early 2013. Both the paper and online modes of the survey were tested, including a paper copy of the version 2 instrument. Notification letters were mailed to sampled vessel owners in September of 2013 to alert them that survey packets would be arriving shortly thereafter. All mailings and the survey instrument were in English. A few days after the notifications were sent, 1,400 survey packets were mailed to the vessel owners in the sample, and reminder postcards were sent a week later to those who had not yet responded. Two weeks later a second round of survey packets were mailed to those who still had not responded. By mid-October of 2013, only 111 vessel owners sent back fully completed surveys (95 by mail and 16 online), 8 vessel owners refused, 6 had sent back incomplete surveys, and 13 were returned because they could not be delivered because of a bad address or other reason. The survey window remained open until January 13, 2014 with a final tally of 160 completed surveys. Data entry was conducted by the contractor, and the final disposition and raw data set were sent to SSB by ERG in May of 2014.

4. RESULTS

The vessel owner survey provides useful information for an important segment of the commercial fishing industry. More robust analysis, as described later, will help inform the implementation of the survey on a recurring basis and enable the development of a time series of data to examine trends in the industry. However, the first year of data has provided rich and instructive results, which are discussed in relation to each of the performance measures below. Statistical procedures included descriptive statistics and bivariate cross-tabulations with Pearson chi-squares and p-values reported in parentheses.

4a. General and Demographics

Primary landing and mooring ports among respondents were very widely distributed across coastal states from Maine to North Carolina (Table 1). The largest percetage of respondents identified lobster as their primary fishery (39%), and only 1 other fishery, summer flounder, was represented by more than 10% of the sample (Table 2). Based on the small sample sizes for all primary fisheries other than lobster, results from analyses across the 5 performance measures will be reported for lobster and all other fisheries combined. Among the fisheries categorized as "other" were multispecies groundfish, scallop, black sea bass, herring, mackerel, monkfish, skate, squid, tilefish, and other non-specified fisheries.

Over three-quarters (76%) of participants across all fisheries were married. There was no significance difference in marital status by fishery, although 83% of participants in fisheries other than lobster were married as compared to 68% of participants in the lobster fishery. Similar to the findings of the crew survey (Henry and Olson 2014), this difference could be due to the comparatively larger representation of young (under 40 years of age) crew members within the lobster fishery as compared with all other fisheries (Figure 1). Vessel owners' ages ranged from 17 to 76, with an average age of 56 and a median age of 57. There was no significant difference in the ages of those in the lobster fishery versus all other fisheries. About 40% of respondents had at least a 2-year college degree, 48% had a high school diploma or equivalent, and 12% had not completed high school. There were statistically significant differences by fishery in education attainment ($\chi^2 = 13.69$, df = 144, $p<.01$), where df refers to degrees of freedom[3]. Roughly 70% of respondents in the lobster fishery had only a high school education or less, compared with about 52% of those in all other fisheries (Figure 2). Nearly the entire sample was non-Hispanic white (99%), and the vast majority (88%) of those who at least partially completed the survey identified English as their primary language. No other primary languages were identified, though. There were 20 respondents who did not answer the survey item asking about primary language spoken at home among those who either completed or partially completed the survey. The crew survey sample was considerably more racially and ethnically diverse, but the overwhelming majority (85%) was still non-Hispanic white (Henry and Olson 2014).

[3] degrees of freedom are the number of observations in a data set with the freedom to vary independently when making a statistical calculation. In the case of this report, the number of degrees of freedom is equal to the number of observations minus one (n-1)

4b. Financial Viability

Annual fishing income was solicited by asking respondents to approximate their 2012 fishing income by selecting 1 of the 15 $10,000 bins, ranging from $10,000 or less to $140,000 or more (Figure 3). The income range corresponding to the average annual fishing income bin across all fisheries was approximately $50,000 to $60,000. The median income category was $40,000 - 50,000. There was no significant difference in annual fishing income among vessel owners by fishery. While the largest number of respondents reported being in the $10,000 or less category, there was a relatively large contingent in the highest income bracket of $140,000 or more. Well over half reported that fishing is their primary (i.e., most important) source of household income, and the vast majority (94%) of vessel owners whose primary income comes from fishing reported that fishing is at least 50% of their income. Among those who reported that fishing was not their primary source of income, approximately 75% reported that their other source of primary income accounted for 50% or more of their overall income. Alternative sources of income varied so widely that no more than 2% of respondents reported having any other source of income in common. In general, there appears to have been fairly heavy reliance on fishing as a primary source of income for fishing vessel owners across all fisheries.

Most vessel owners in the sample were sole-owners of a single boat (68%), but approximately 22% were sole owners of 2 or more boats. On the other hand, approximately 13% of respondents reported that they were co-owners of a single vessel, and about 8% reported that they were co-owners of 2 or more vessels. The vast majority of respondents (91%) did not sell any of their commercial vessels in 2012. Less than 10% of the sample reported having sold a commercial vessel in 2012, either on their own or with other owners. Only about 12% of the sample reported having purchased a commercial vessel, and the overwhelming majority did not purchase an interest (99%) in a commercial vessel in 2012. In terms of business longevity, the largest proportion of respondents, or about 43%, reported that their fishing incomes will be enough to sustain their businesses in the short-term (i.e., 1-2 years). Beliefs about short term viability differed significantly by fishery. Vessel owners in the lobster fishery were significantly more likely to report that they believe their businesses will be viable in the short-term than those in other fisheries ($\chi^2 = 56.43$, df = 143, $p<.001$). Fifty-two percent of lobster vessel owners agreed that their incomes were enough to sustain their businesses over the short term, compared to only 32% of vessel owners in all other fisheries (Figure 4).

Vessel owners' outlooks on the medium- (3-4 years) and long-term (5+ years) viability of their fishing business, however, were much less positive. Approximately 77% of vessel owners across all fisheries either disagreed or were uncertain that their fishing incomes were enough to sustain their businesses over the medium term. Even more resoundingly, about 88% reported that they either disagreed or were uncertain that their businesses were sustainable over the long-term. There were no significant differences by fishery in medium- or long-term assessments of business viability, suggesting that economic uncertainties are pervasive among vessel owners throughout New England and the Mid-Atlantic states.

The amount of time vessel owners in the sample were involved in commercial fishing ranged from 2 to 60 years, with a mean of about 33 years and median of 35 years. The distribution of years of involvement in commercial fishing is displayed in Figure 5. There was no significant difference in years of involvement in commercial fishing by fishery. In terms of family history in commercial fishing, most vessel owners reported that their families have had 2 or more generations involved in commercial fishing, but a substantial proportion (37%) reported that they are first-generation fishers. The number of generations in commercial fishing was not

significantly different by fishery. Regarding recent family involvement in commercial fishing, approximately 65% of vessel owners reported that some members of their immediate family were involved in commercial fishing in some capacity in 2012. Recent family involvement did differ significantly by fishery. Almost three-quarters of those fishing primarily in the lobster fishery reported that a family member was involved in commercial fishing in 2012, compared to only just over half of those in all other fisheries (Figure 6).

There were no significant differences by fishery in terms of specific roles family members of respondents took on within the fishing industry, whether within respondents' businesses or in other fishing-related businesses. About 62% of vessel owners across all fisheries represented in the sample had at least one member of their family working on their own vessel in 2012. Similarly, about 60% of vessel owners reported having at least 1 member of the family involved in their own fishing business in some capacity. Finally, about 79% of vessel owners reported that they had at least 1 family member involved in a fishing business other than their own.

4c. Distributional Outcomes

Systems of crew compensation varied slightly, but share systems were the most widely utilized by vessel owners in this sample. About 67% of vessel owners reported paying crew on their vessels through some kind of share system, while about 19% had a per-trip pay system, and 11% had some other system of compensation. The fewest number of vessel owners (n = 3) reported having an hourly wage system in place. Regarding share systems, about 17% of vessel owners reported that they took less than half of the share, about 21% took exactly half of the share, and roughly 61% reported that they took more than half of the share. The distribution of self-reported owner take-home of the share is depicted in Figure 7. Interestingly, among those who reported taking more than half of the share, the largest portion (about one-quarter) said that they took 80% of the share.

Over three-quarters of the vessel owners reported that they operated their own vessels versus having hired a captain for most trips in 2012. Those primarily fishing in the lobster fishery overwhelmingly operated their own boats, and a significantly greater percentage of vessel owners ($\chi^2 = 12.61$, df = 112, $p < 0.001$) were owner-operators versus having hired captains compared to owners in all other fisheries (Figure 8). The survey item which asked about fishing-related expenses was structured as an open-ended response, so it was not possible to construct a continuous variable in terms of percentages of expenses paid, but a large proportion (n = 110, 34%) of those who responded to this item mentioned either having paid "100%," "all," or another variation on the statement that they had paid all of their vessels' expenses. About 87% (n = 108) of vessel owners reported that there were no new expenses associated with their vessels in 2012 that their crew had to pay that they were never asked to pay before.

Most respondents (65%) reported that their vessels employed 2-3 crew members in 2012. Crew size differed significantly by fishery. Vessel owners primarily fishing in the lobster fishery were significantly more likely to employ 2-3 crew members, whereas those in all other fisheries were much more likely to employ more than 3 crew members (Figure 9). Duration of crew employment was also assessed as an open-ended response, so the following frequencies reflect aggregates of qualitative responses which correspond to each length of employment category. Respondents were asked how many of their crew had worked for them for a period of less than 1 year, 2-4 years, and 5 years or more. Fifty respondents reported that they had at least 1 crew

member who had been employed less than 1 year, 52 respondents reported that they had at least 1 crew member who had been employed for 2-4 years, and 70 respondents reported that they had at least 1 crew member who had been employed for 5 years or more. About 67% of vessel owners across all fisheries reported that they were either satisfied or very satisfied with crew members on their vessels in 2012. Approximately 68% of vessel owners across all fisheries reported that they had not hired any new crew members in 2012, and the majority among those who had hired new crew hired 3 or fewer.

4d. Stewardship

Across all fisheries, vessel owners reported low levels of discarding, bycatch, and highgrading. Those in the lobster fishery expressed significantly lower levels of highgrading compared to those in all other fisheries ($\chi^2 = 8.42$, df = 102, $p < 0.01$), but there was no significant difference in self-reported levels of discards or bycatch by fishery. Respondents were given an open-ended option to explain the most important reasons for levels of discards, bycatch, and highgrading in their respective fisheries. Reasons given for discards most often related to regulations and quotas.

The vast majority (95%) of vessel owners in the sample across all fisheries either agreed or strongly agreed that the environment was important to them because it was how they made their living. Similarly, the vast majority (95%) either agreed or strongly agreed that they make an effort to not harm their respective fisheries. Views about the possibility of overfishing in the ocean were slightly more varied, but the clear majority (73%, n = 154) of vessel owners either disagreed or strongly disagreed that the ocean is too large to overfish. Those fishing primarily in the lobster fishery were significantly more likely to strongly agree that the ocean is too large to overfish ($\chi^2 = 17.10$, df = 146, $p < 0.01$). This difference is depicted in Figure 10.

4e. Governance

A few different sets of questions were utilized to assess vessel owners' views about the management process and governance of their primary fisheries. Most of the items were assessed on a Likert-type scale with 5 responses ranging from "strongly disagree" to "strongly agree." Additionally, a few items aimed at assessing owners' views about the effects of regulations on discards, bycatch, and high-grading were asked on a similar 5-category Likert scale ranging from "significantly decreased" to "significantly increased." These particular 3 items focus on respondents' views about the impact of regulations on these phenomena, whereas the questions relating to bycatch, discards, and high-grading referenced above in Section 4d were only interested in their views about overall levels of these phenomena regardless of the causes.

About 82% across all fisheries either agreed or strongly agreed that fishermen have a responsibility to participate in the management process, with no significant differences in these beliefs by fishery. Despite this overwhelming consensus that fishermen should participate, a smaller majority of 69% across all fisheries reported that had actually participated in the past. Approximately 60% of owners across all fisheries either disagreed or strongly disagreed with the statement that fishermen have been effectively integrated into the management process. This disagreement is driven mostly by those in the lobster fishery (Figure 11). Owners fishing primarily in the lobster fishery were significantly more likely to disagree with the notion that fishermen have been effectively integrated ($\chi^2 = 12.44$, df = 68, $p < 0.01$). Exactly half of the 32

owners who replied to the item about the seriousness of managers in integrating fishermen responded that they either disagreed or strongly disagreed that managers have been serious about integrating fishermen into the process. None of those who provided a response strongly agreed, and less than one-quarter agreed.

In terms of presence and participation at public meetings, vessel owners sampled felt mostly distrustful of those in charge and did not feel welcome or listened to by managers. A large percentage (34%) either disagreed or strongly disagreed that they felt welcome at public meetings, but responses were approximately normally distributed across response categories with the largest percentage reporting being neutral towards feeling welcome at public meetings. A clear majority (65%), on the other hand, either agreed or strongly agreed that fishermen's opinions would not be taken seriously at public meetings. An even larger majority (76%) either agreed or strongly agreed that they did not trust managing authorities to make the right decisions when managing fisheries.

Views about information presented and the process at public meetings were generally negative as well. About 60% of respondents did not believe information presented by people in charge of the process. None of the respondents reported having "strongly disagreed" that they did not believe information presented and only nine respondents (12%) reported having "disagreed" with the statement that they did not believe information presented by management. Even though a majority agreed that they did not believe information presented by managers, the largest portion of respondents (43%) reported that they were neutral to the notion that they did not have the opportunity to correct inaccurate information. Few, however, disagreed or strongly disagreed (14%) that they had no opportunity to correct information that they believed to be inaccurate, and many more (33%) either agreed or strongly agreed. Almost half (49%) of respondents either disagreed or strongly disagreed that they were in agreement with the findings of the most recent stock assessment for their primary fisheries, and about 32% were at least neutral to this proposition.

Regarding participation in the form of contributing information, the largest percentage of respondents (47%) either disagreed or strongly disagreed that they had the opportunity to add new and relevant information to the decision-making process. Many were also neutral to the notion that they could add new information (37%), relatively few agreed that they could (16%), and none of the respondents strongly agreed that they had the opportunity to add new information to the process. In addition to the disagreement over whether adding new information was a possibility, a majority (66%) either agreed or strongly agreed that opinions of fishermen were not taken seriously, and a similar majority (67%) either agreed or strongly agreed that people in charge of the process were not equally fair to everyone involved. Despite all of these relatively negative views regarding the process, no clear consensus emerged about the notion that respondents had the right to appeal decisions that they believed were unfair. Roughly 20% either agreed or strongly agreed, 38% were neutral to, and 41% either disagreed or strongly disagreed that they had the right to appeal unfair decisions.

Regarding the management of respondents' primary fisheries, a host of items were aimed at assessing respondents' views about the impediments to fisheries access and goals of the management regimes. Most respondents across all fisheries agreed (~72%) with the notion that new fishermen should not reduce opportunities to fish for existing fishermen. Responses varied more widely, however, to the issue of whether management should maximize the number of fishermen. Roughly 36% disagreed to some extent, 27% were neutral to, and 37% agreed to some extent that management should maximize the number of fishermen. No significant

differences emerged by fishery on this item. By contrast, views about access to fisheries by users other than commercial fishermen varied significantly by primary fishery (Figure 12). About half (51%) of lobster vessel owners agreed to some extent that fishing areas should be off-limits to other users, whereas only about 34% of those in all other fisheries agreed with this notion (χ^2 = 18.54, df = 146, $p < 0.001$). There was little consensus, yet no significant differences by fishery, on the topic of whether management changed quickly with changing conditions of the fisheries. About 45% agreed to some extent, 21% were neutral to, and 24% disagreed to some extent with the notion that management was able to change quickly when conditions of the fisheries changed. A couple interesting and significant differences emerged from analyses of items relating to respondents' views about the goals of management for their fisheries. As depicted in Figure 13, lobster vessel owners were significantly more likely than those in all other fisheries to agree to some extent (~ 41% agreement of lobster owners versus ~ 23% of those in other fisheries) that goals of their fishery were being met (χ^2 = 11.77, df = 147, $p < 0.05$). Similarly, lobster vessel owners were more likely (χ^2 = 13.14, df = 144, $p < 0.01$) to have agreed that the management plan for their fishery helped to protect the number of fish (Figure 14). Finally, there were significant differences by fishery about whether respondents were able to fish where and when respondents wanted. Lobster vessel owners were significantly more likely to agree to some extent that they could fish where (χ^2 = 36.81, df = 149, $p<.001$) and when (χ^2 = 10.78, df = 150, $p < 0.05$) they wanted. These effects are depicted in Figures 15 and 16, respectively.

There were a variety of interesting findings regarding responses to items relating to the rules and regulations of respondents' primary fisheries. Slightly more than half (58%) of respondents agreed or strongly agreed that it was easy to find information about the rules and regulations that governed their primary fisheries in 2012. Similarly, half of respondents either agreed (39%) or strongly agreed (11%) that the rules for their primary fisheries were easy to comply with. Only about 34% disagreed or strongly disagreed with the notion that the rules had been easy to comply with. There was a significant difference in these views by primary fishery (Figure 17). About 60% of those in the lobster fishery agreed, whereas only about 40% of those in all other fisheries felt the same about the ease of compliance (χ^2 = 9.52, df = 69, $p < 0.05$). Responses were more widely dispersed to the question of whether fines had been fair. Roughly 28% agreed to some extent that the fines had been fair in their primary fisheries, whereas about 40% disagreed and 32% were neutral to the statement that the fines had been fair. Respondents differed significantly by primary fishery on this item as well (Figure 18). About 42% of lobster fishers agreed, compared to only about 14% of those in all other fisheries (χ^2 = 14.09, df = 67, $p < 0.01$).

In contrast to views about fairness and ease of compliance, there was slightly greater consensus among respondents about the impact of the rules and regulations in terms of costs and ability to fish. Just over half (58%) of respondents either agreed or strongly agreed that regulations had caused their costs to increase, compared to only about 14% having disagreed with this sentiment. In similar fashion, slightly over half (53%) of respondents agreed to some extent that regulations in their primary fisheries had been too restrictive, compared to only about 16% who disagreed at all with this notion. While at least half of respondents felt regulations had caused cost increases and were too restrictive, there was much less agreement over whether regulations were unfair or even necessary in the first place. Only about 33% agreed with the notion that regulations had been unfair, compared to almost the same percentage (32%) in disagreement with this notion. Similarly, about 31% agreed to any extent that regulations had been necessary for their primary fisheries, but only about 41% disagreed with this statement and

roughly 28% remained neutral. Much greater consensus emerged on the topic of the future impact of current regulations. There was overwhelming agreement with the expectations that, over the next 5 years, regulations will likely change (74%), and they will cause costs to increase (82%). No significant differences emerged by fishery on any of these items.

A variety of interesting findings emerged from items assessing respondents' views about the specific impacts of rules and regulations on their primary fisheries. A small majority of respondents (54%) agreed with the notion that the amount they were allowed to catch under the 2012 regulations was too low because it did not cover their investments in their boats. Lobster vessel owners, however, expressed significantly higher disagreement with this notion than those in all other fisheries (Figure 19). About 40% of lobster vessel owners either disagreed or strongly disagreed with the notion that allocated catch was too low to even cover their investments, whereas only about 20% in all other fisheries disagreed with this notion ($\chi^2 = 10.68$, df = 68, $p < 0.05$). Responses were divided fairly evenly across response categories to the statement, "it would be fairer if everyone could catch the same amount." About 38% of respondents agreed to some extent and 39% disagreed with the notion that it would be fairer if everyone could catch the same amount, but there were significant differences by fishery. As depicted in Figure 20, lobster vessel owners largely disagreed (74%) that it would be fairer if everyone could catch the same amount, whereas far fewer (43%) of those in all other fisheries felt the same way ($\chi^2 = 18.01$, df = 65, $p < 0.001$). Views about the fairness of allocations in the context of the ability to sustain livelihoods also differed significantly by primary fishery (Figure 21). Slightly over half (53%) of those in fisheries other than lobster agreed to some extent that allocations were unfair because they needed more to sustain their livelihoods as fishermen, but only about 30% of lobster vessel owners expressed agreement with this notion ($\chi^2 = 14.87$, df = 65, $p < 0.01$). On the other hand, no significant differences emerged by fishery with respect to respondents' beliefs that the resource "should be allocated to those who need it most to survive as fishermen." Roughly 31% agreed to some extent and 33% disagreed across all fisheries that the resource should be allocated such that it favors those who need it most to survive. There was also little consensus with respect to the fairness of the amount respondents were able to catch in 2012, but there were no significant differences by fishery. About 38% agreed that the amount they were able to catch was fair, whereas about 43% disagreed with this notion.

Finally regarding the effects of regulations, respondents were asked to report their perceptions of how much the regulations had impacted levels of bycatch, discards, and highgrading in their primary fisheries. Vast majorities of respondents either reported that there had been no change to any of the above mentioned phenomena or they did not know what the effects had been. No significant differences by fishery emerged.

4f.Well-being

With respect to items assessing job satisfaction and well-being, the only significant difference by fishery was on the topic of personal satisfaction with overall physical health. While no differences by fishery emerged on the other items assessing well-being, there were several interesting takeaways from the descriptive statistics of these items. Satisfaction with earnings was not unanimous, as roughly 26% of respondents expressed extreme dissatisfaction, 29% reported feeling either somewhat or extremely satisfied, and about 24% were neither satisfied nor dissatisfied. Regarding the predictability of their earnings, responses were similarly dispersed across response categories. About half of respondents were neither satisfied nor dissatisfied with

their time away from home, and the majority of others were either satisfied or extremely satisfied (26%). The majority of respondents (65%) were either satisfied or extremely satisfied with the adventure of the job. In terms of job safety, roughly 55% of respondents were either somewhat or extremely satisfied with this aspect of the job. On the other hand, a similar percentage (~56%) were neither satisfied nor dissatisfied with the physical fatigue of their work, and the largest proportion of respondents (~45%) were also neither satisfied nor dissatisfied with the healthfulness of the job. The vast majority (74%) were somewhat-to-extremely satisfied with the challenge of the job. Similarly, an overwhelming majority of respondents (81%) reported some level of satisfaction with the opportunity to be their own boss in their line of work. Aside from satisfaction with aspects of the job, respondents were also asked to rate their level of satisfaction with general aspects of their lives. Overwhelmingly (82%) respondents reported feeling somewhat or extremely satisfied with their life. By contrast, vessel owners in the lobster fishery were more likely to be somewhat dissatisfied with their physical health, generally speaking, than those in other fisheries ($\chi^2 = 11.38$, df = 72, $p < 0.05$). This difference is depicted in Figure 22.

Several other items relating to well-being were aimed at assessing respondents' levels of agreement with statements about their connections to others within their fisheries and communities and their pride, devotion, and leadership as members of the fishing industry. Among these items, only the desire to fish part-time was found to differ significantly by fishery. Respondents from the lobster fishery were less likely to want to fish part-time than their counterparts in all other fisheries ($\chi^2 = 10.27$, df = 144, $p < 0.05$). Several other interesting findings emerged from the investigation of descriptive statistics on these items. Respondents were divided on whether they felt most people would say they were leaders in their local communities. About 22% agreed, 22% disagreed, and 47% were neutral to the notion that most people would say they were leaders in their communities. Similarly, respondents were divided on the question of whether most people would say they were leaders within their primary fisheries. In contrast to these divisions, the vast majority of respondents (87%) either agreed or strongly agreed that they were proud to identify as fishermen, a large majority (82%) reported that they felt a strong connection to other fishermen, and the overwhelming majority (92%) reported that they enjoyed fishing. Smaller majorities disagreed with the notions that they had considered leaving the industry (~50%) or felt as though fishing is just a job to them (69%).

Finally among items assessing well-being, respondents were asked whether they would fish again if they had to live their lives over again and whether they would advise the young to enter into fishing as a career. A very interesting contrast emerged from the comparison of descriptive statistics on these 2 items. Most respondents reported that they would not advise the young to enter into fishing (~73%), but that they would still be commercial fishermen if they could start over again (86%). There were no significant differences in these items by primary fishery.

5. LESSONS LEARNED AND FUTURE STEPS

This vessel owner survey provides important information useful to policy-makers, researchers, and academics interested in issues related to the management of fisheries in the Northeast and Mid-Atlantic and their impacts on commercial-fishing vessel owners in these regions. Altogether according to the sample, commercial vessel owners in New England and the Mid-Atlantic were largely single-boat owning business-people who did not sell their vessels in 2012. Generally speaking, the majority of respondents had at least some family members who

were involved in commercial fishing in some capacity in 2012, whether on their own vessels, in their own businesses, or in some other fishing-related business activities. Respondents largely felt responsible to participate in the management process and reported having participated in the past, but many expressed distrust of management and feeling excluded from or not sufficiently integrated into the process by managing authorities. While vessel owners were generally split on their levels of satisfaction with the predictability and amount of their earnings, the vast majority felt satisfied with the adventure and challenge of the job, the opportunity to be their own boss, and reported that they were proud to be fishermen and felt strong connections to other fishermen. There have been very few survey research efforts to better understand attitudes and beliefs about management and other aspects of commercial fishing among commercial fishing vessel owners specifically. The results presented in this technical memorandum provide a baseline for further inquiry and investigation into the attitudes and beliefs among specific subgroups among the general commercial fishing population at the regional level, namely vessel owners in the Northeast and Mid-Atlantic in this case.

In addition to the results of the survey, a number of lessons emerged from the data collection efforts and methods employed. The calculated response rate of 11% was far lower than what was expected, and the difficulty in obtaining completed surveys could have been linked to logistical limitations related to funding and time constraints. While reminder postcards were mailed to those who received the survey and second packets to those who had not responded, there were no follow-up phone calls with survey recipients who had not responded. This decision was based on limitations from a fixed budget and prior data from the Annual Cost Survey on how follow-up calls affected response rates. Survey fatigue could also have contributed to the low response rate, as the Social Sciences Branch had also implemented an Annual Cost Survey in 2012 that targeted vessel owners as well (information about this survey can be obtained at the NEFSC SSB 2012 Annual Cost Survey webpage). Finally, the length of the survey was a concern, but the initial round of surveys and resultant data provided the Social Sciences Branch with the necessary information about which survey items contributed the most to the development of social indicators. Therefore, future iterations of this survey will likely be scaled down in length in order to focus on those items which worked best and contributed the most to the development of social indicators. To achieve this result, the Social Sciences Branch plans to employ principal components analysis to determine the variance and explanatory power associated with each individual item relative to their linked indicators within the broader measures. The changes would be incorporated in any future iterations of this survey to ensure reliability of time series data and provide for the ability to compare results across time. Ideally, data collection would occur on a regular cycle (e.g., every 3 years) in order to minimize potential survey fatigue from the burden on respondents to complete multiple surveys consecutively, but with the careful consideration that data collection should be frequent enough to effectively capture changes in attitudes, beliefs, values, and demographics over relatively short intervals.

6. ACKNOWLEDGEMENTS

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project, namely Lou Nadeau, Brielle Kissel, and Andreas Lord. Much gratitude is also due to the vessel owners who participated and provided feedback on the survey in order to help improve its design and implementation.

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Table 1. State where respondents' vessel moored and landed in 2012.

	Vessel Moored		Vessel Landed	
State	**Frequency**	**Percent**	**Frequency**	**Percent**
CT	3	1.68	3	1.68
DE	1	0.56	2	1.12
FL	2	1.12	2	1.12
MA	35	19.55	32	17.88
MD	3	1.68	2	1.12
ME	46	25.70	45	25.14
NC	8	4.47	9	5.03
NH	4	2.23	4	2.23
NJ	21	11.73	21	11.73
NY	9	5.03	10	5.59
RI	18	10.06	15	8.38
VA	8	4.47	9	5.03
Missing	21	11.73	25	13.97
Total	179	100.00	179	100.00

Table 2. Respondents' primary fishery in 2012.

Fishery	Frequency	Percent
Black Sea Bass	8	4.47
Herring	3	1.68
Lobster	69	38.55
Mackerel	1	0.56
Monkfish	1	0.56
Multispecies/Groundfish	12	6.70
Scallop	14	7.82
Skate	2	1.12
Squid	1	0.56
Summer Flounder	20	11.17
Tilefish	2	1.12
Other	23	12.85
Missing	23	12.85
Total	179	100.00

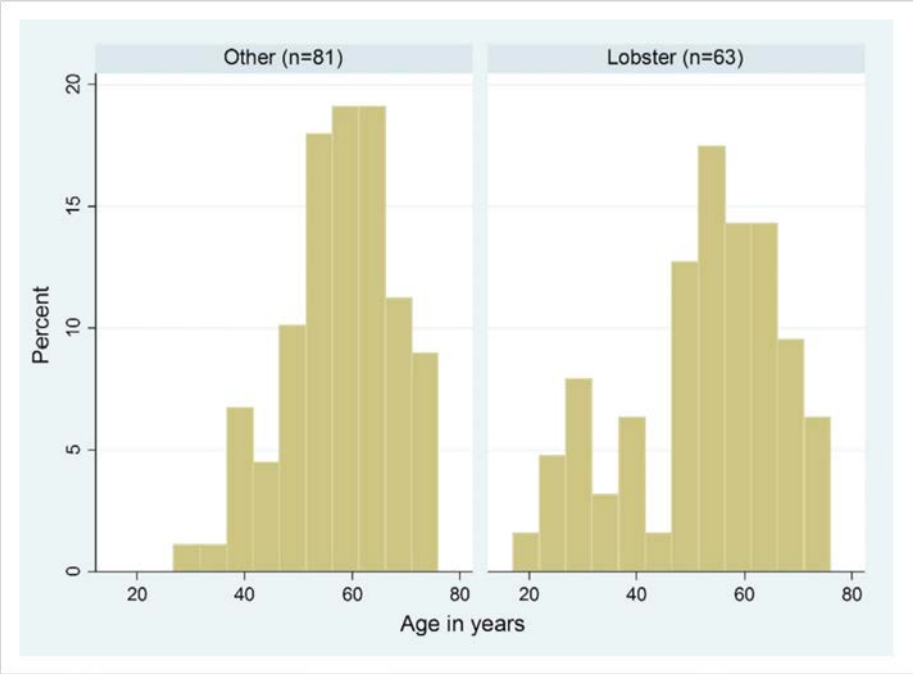

Figure 1. Respondents' age by primary fishery.

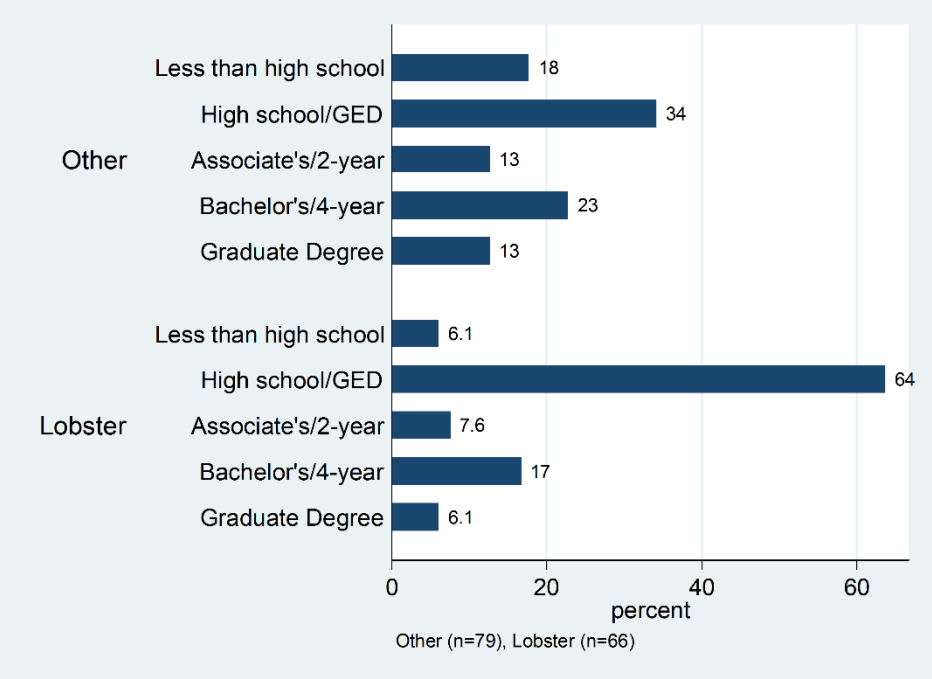

Figure 2. Highest level of education completed by primary fishery.

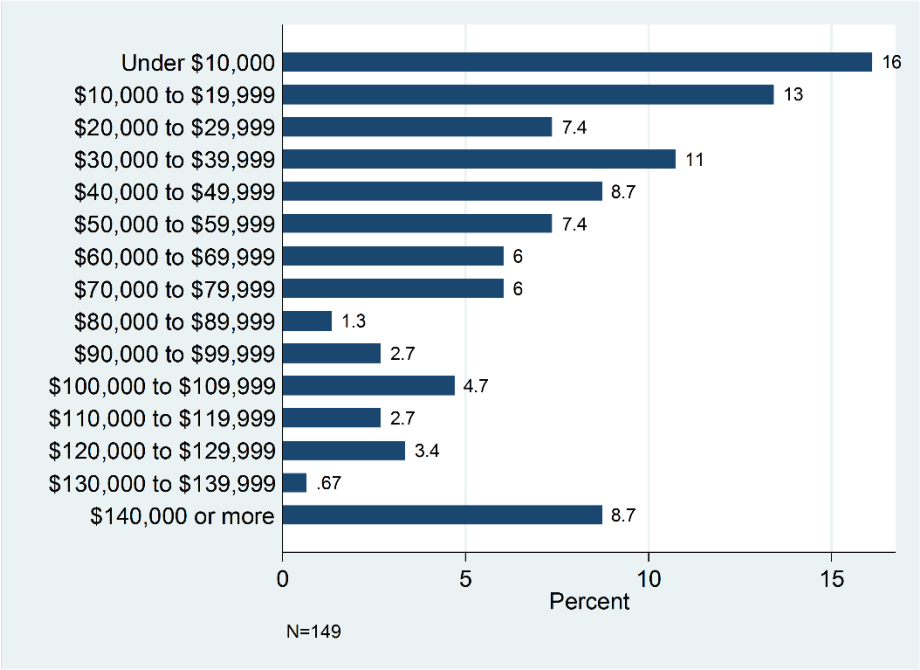

Figure 3. Annual fishing income reported by respondents (U.S. dollars).

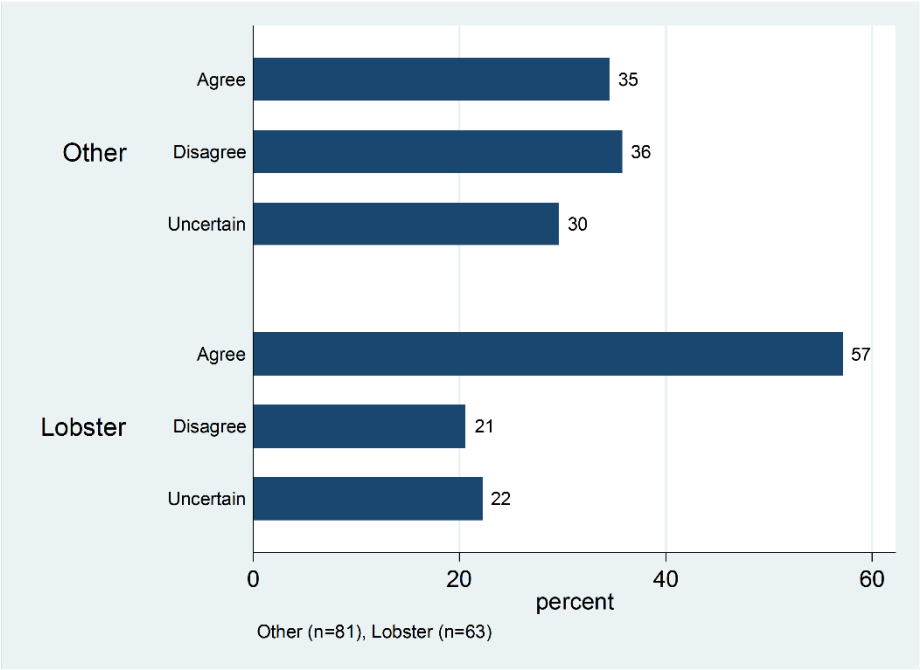

Figure 4. "My fishing income is enough to sustain my fishing business over the short-term (1-2 years)" by primary fishery.

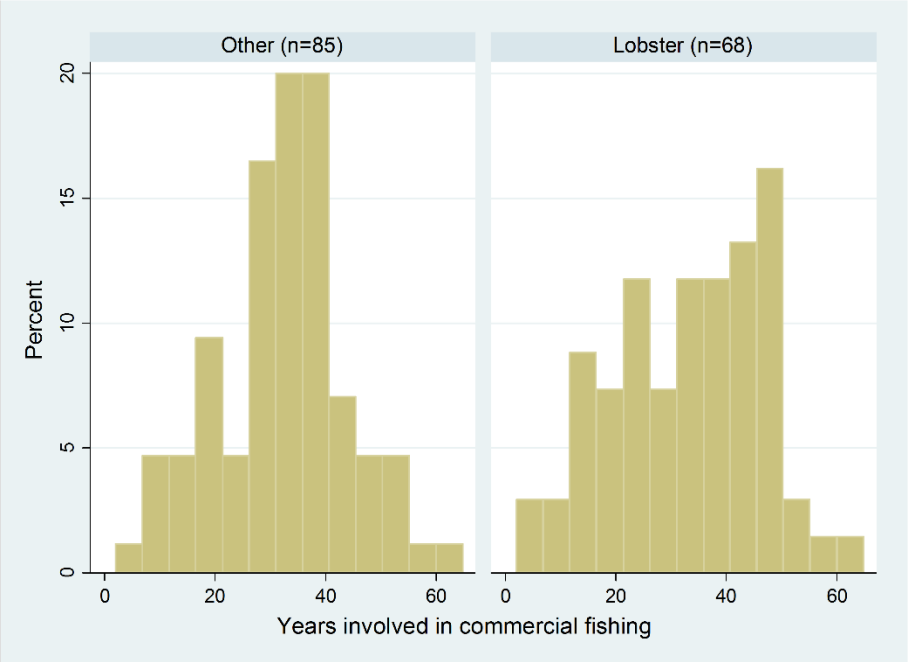

Figure 5. Number of years involved in commercial fishing by primary fishery.

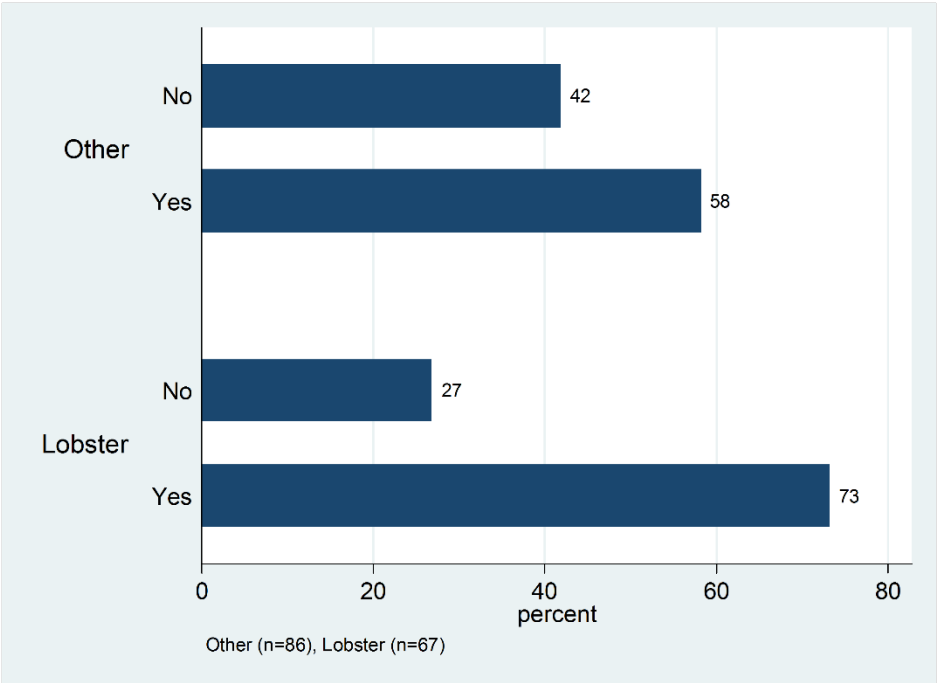

Figure 6. Family members involved in commercial fishing in 2012 by primary fishery.

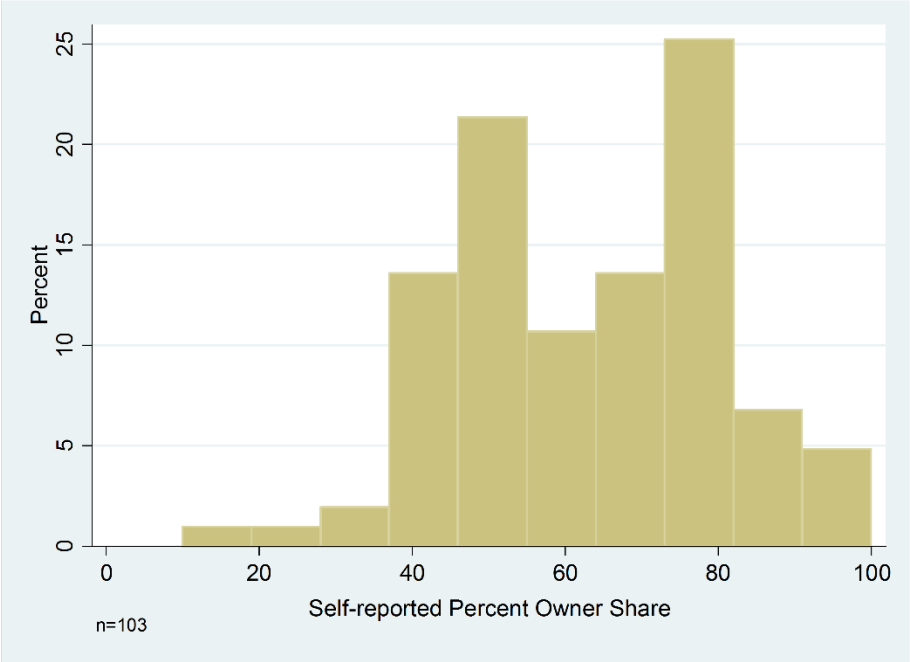

Figure 7. Owner share reported by respondents.

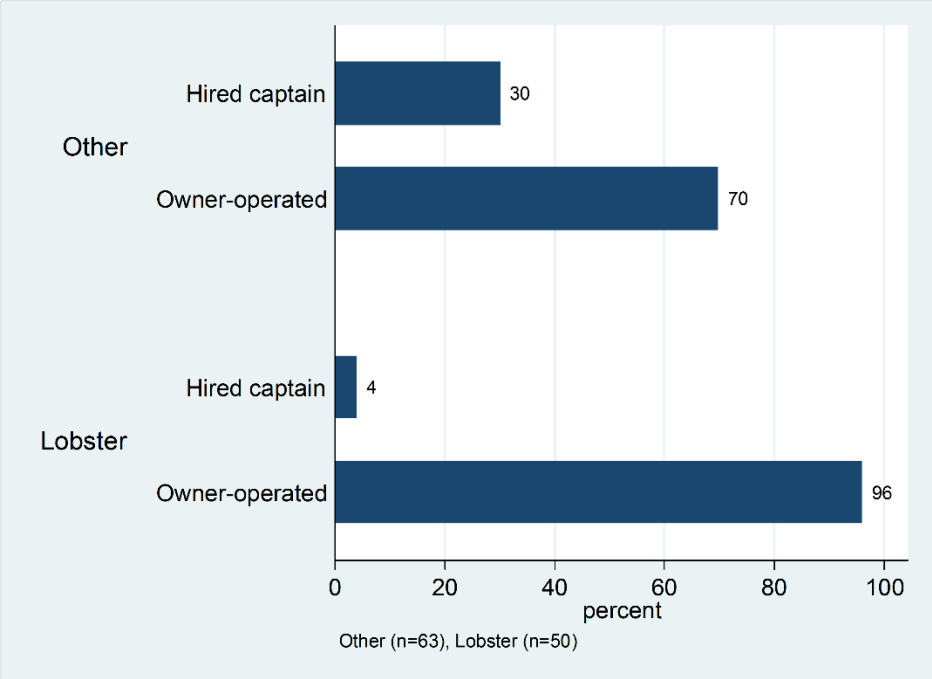

Figure 8. Owner-operated vessels vs. hired captain vessels by primary fishery.

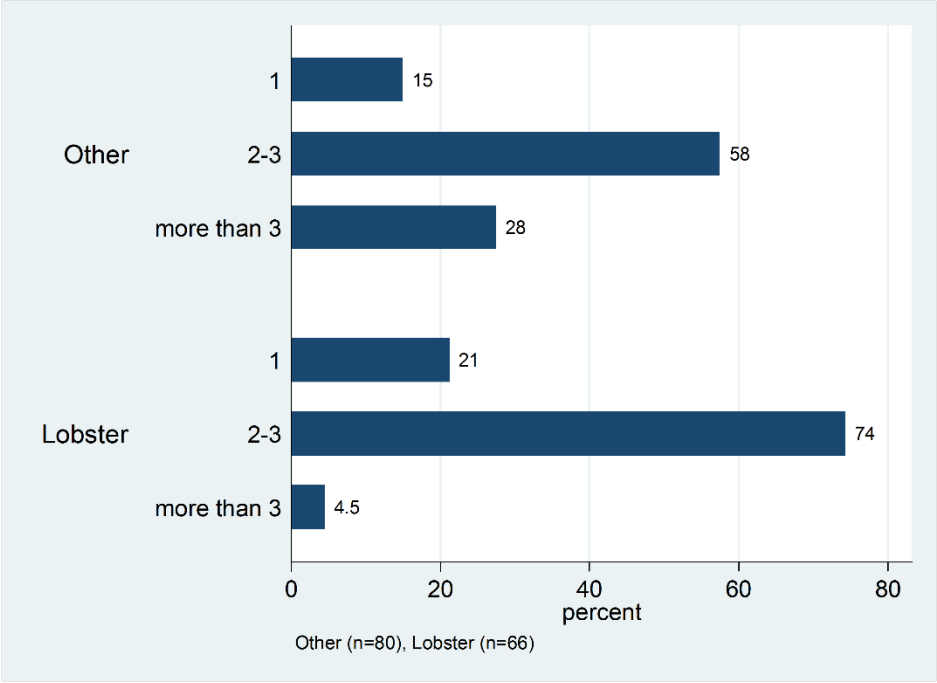

Figure 9. Number of crew employed on respondents' vessel by primary fishery.

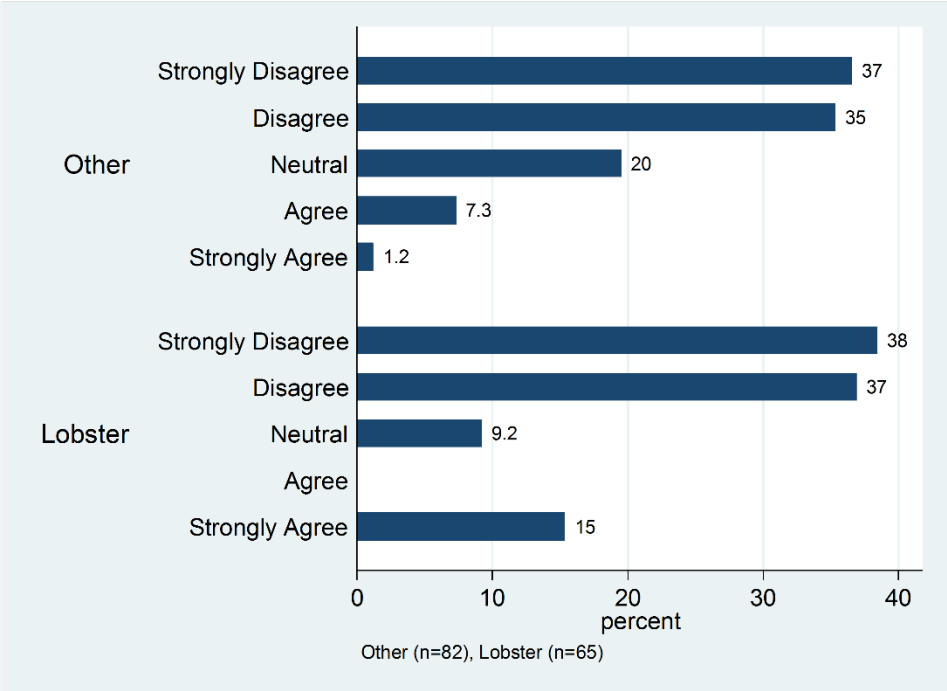

Figure 10. "The ocean is very large, there is no way we can over-fish it" by primary fishery.

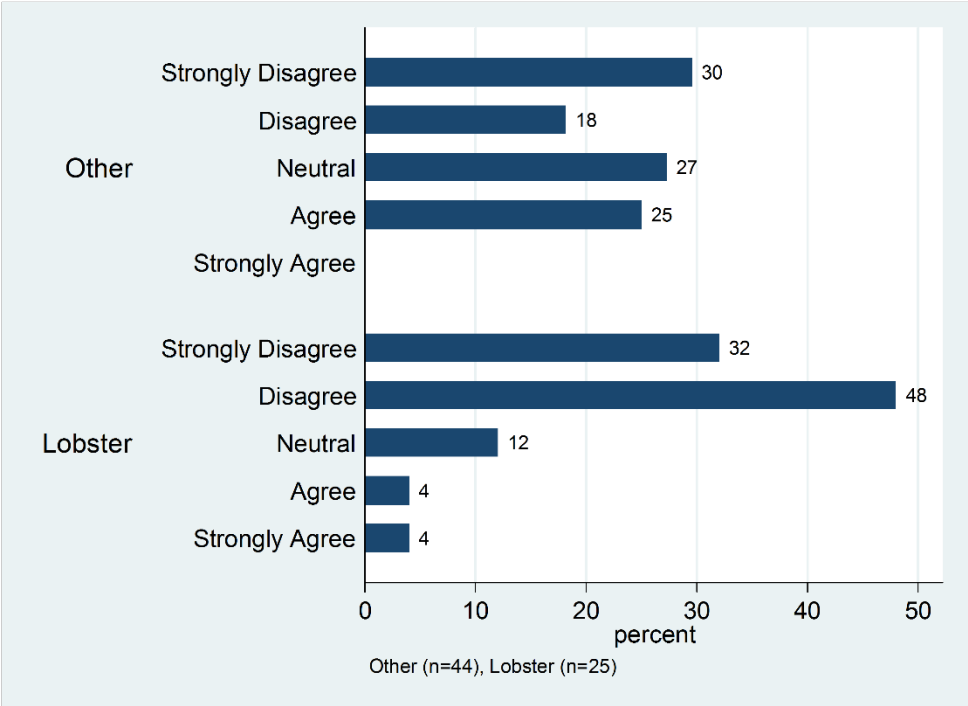

Figure 11. "Commercial fishermen have been effectively integrated into fisheries management decisions" by primary fishery.

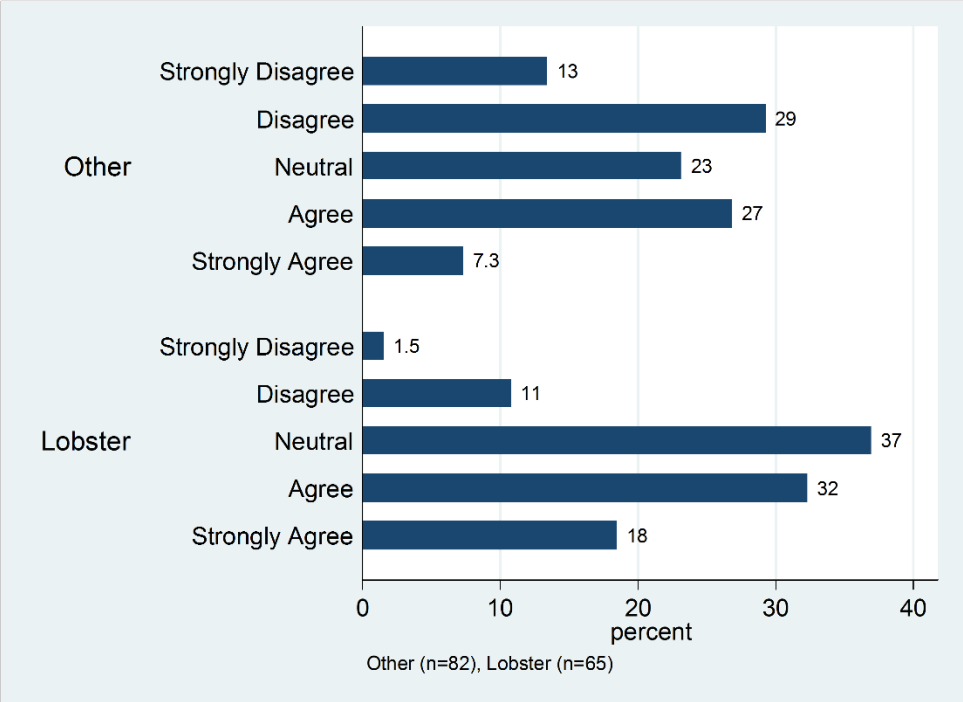

Figure 12. "Fishing areas should belong to fishermen who use them and should be off-limits to other users" by primary fishery.

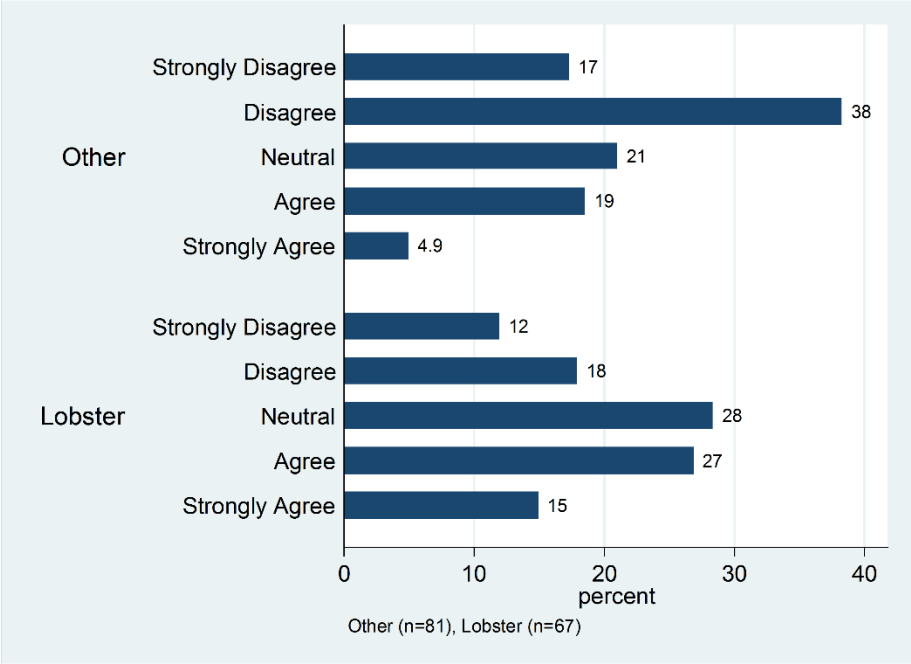

Figure 13. "The goals of the management plan for my primary fishery are being met" by primary fishery.

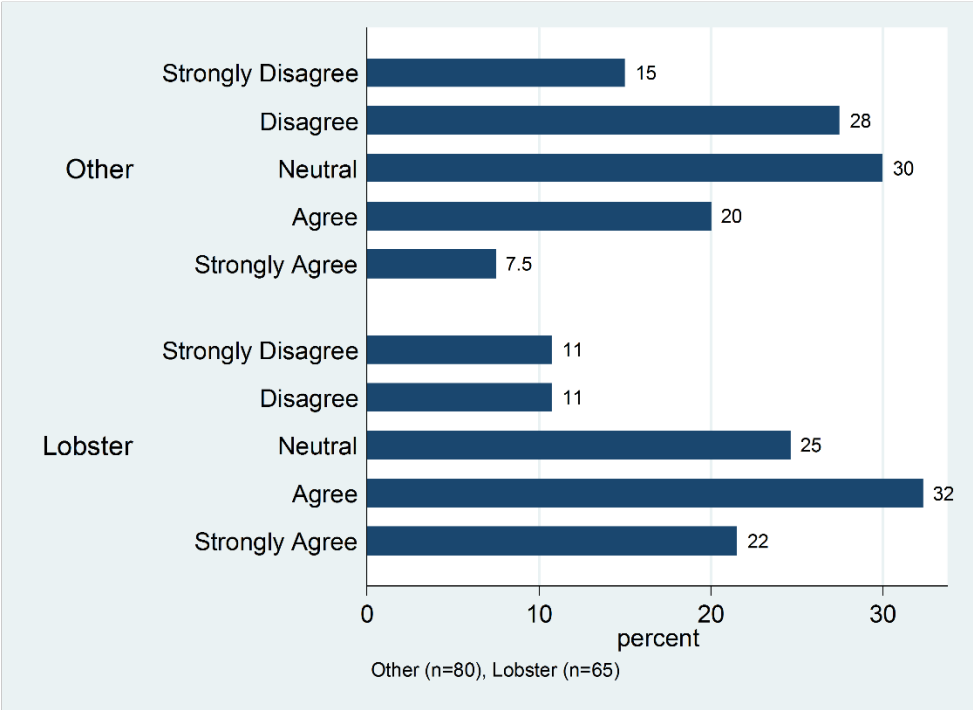

Figure 14. "The management plan for my primary fishery helps protect the number of fish" by primary fishery.

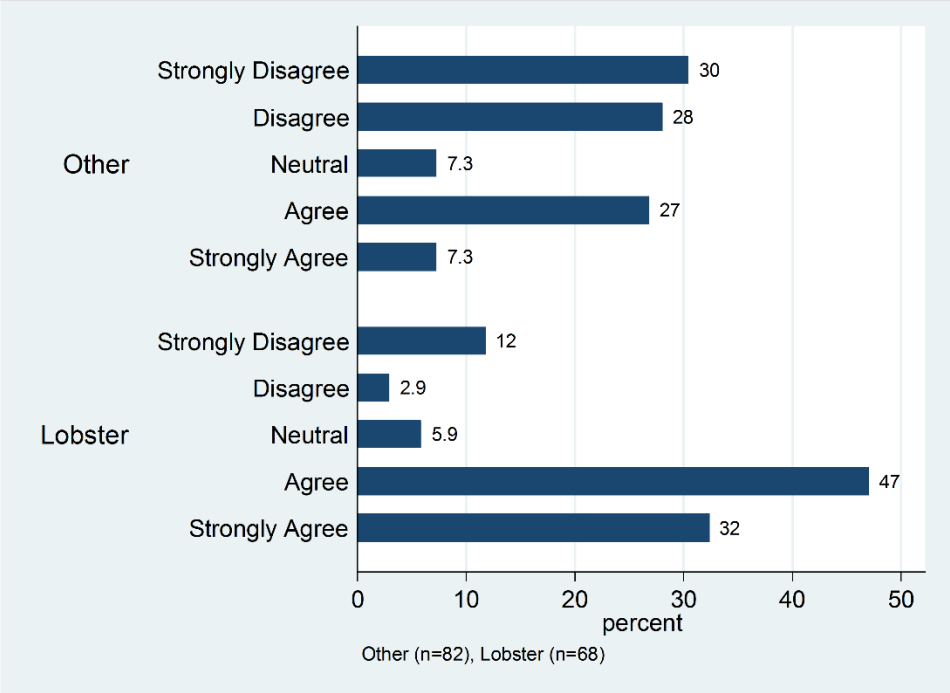

Figure 15. "In my primary fishery, I am able to fish *where* I want" by primary fishery.

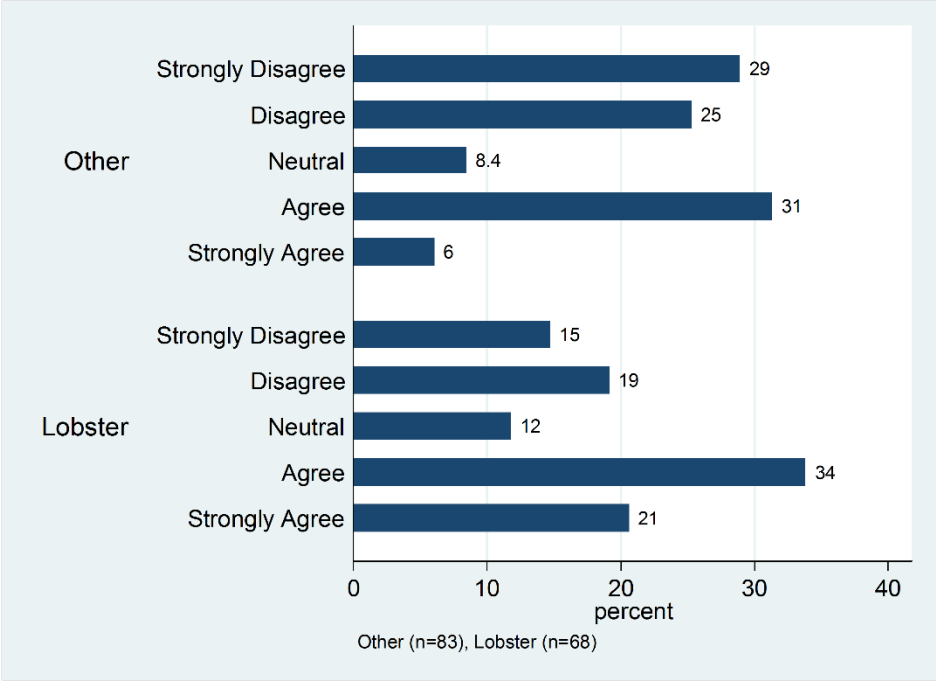

Figure 16. "In my primary fishery, I am able to fish *when* I want" by primary fishery.

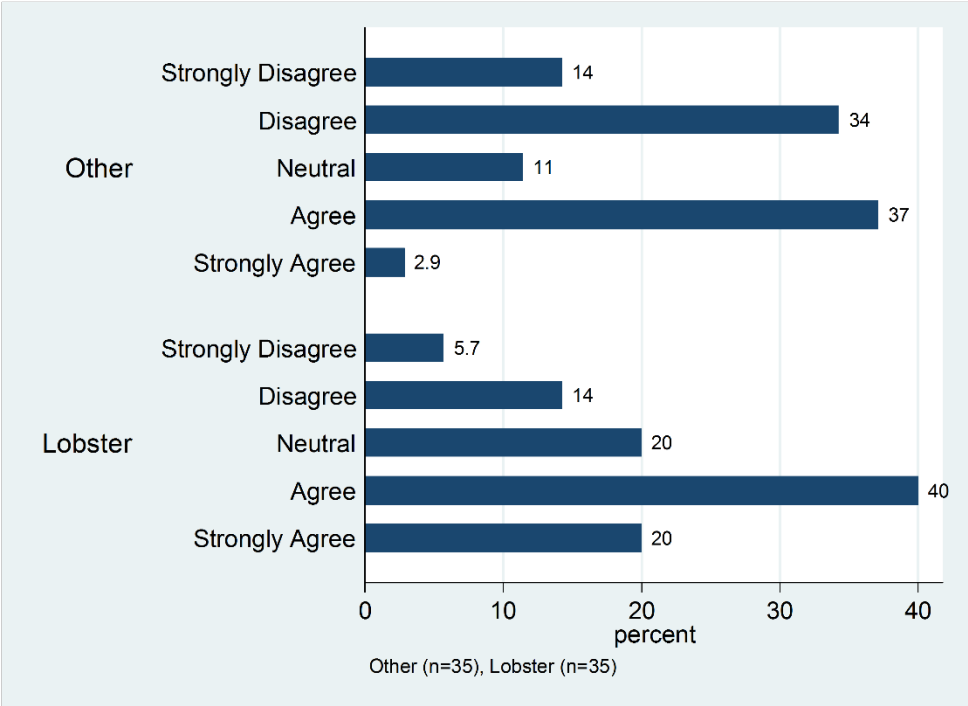

Figure 17. "The rules and regulations were easy for me to comply with when I was fishing in 2012" by primary fishery.

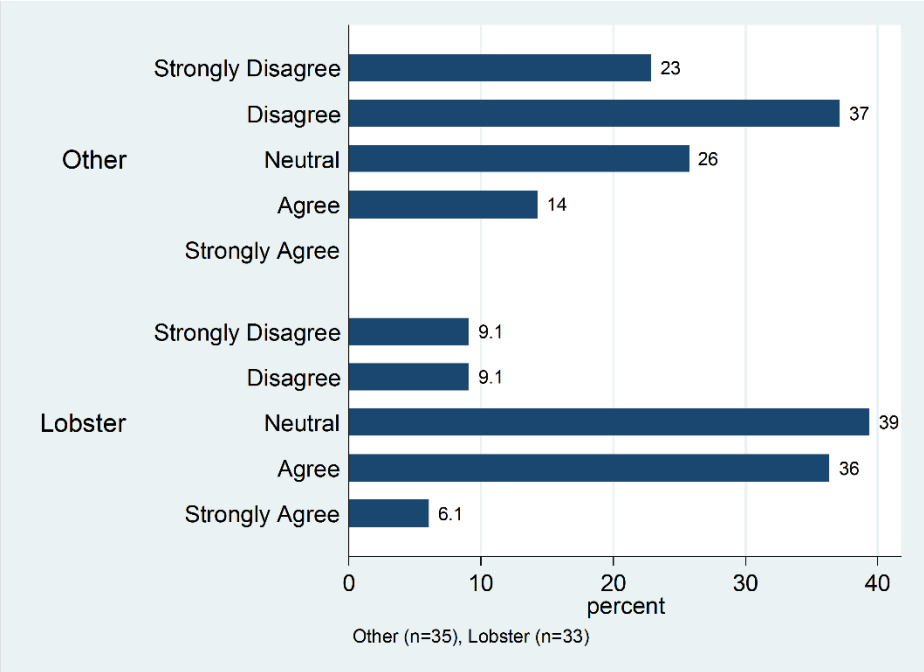

Figure 18. "The fines associated with breaking the rules and regulations in my primary fishery were fair in 2012" by primary fishery.

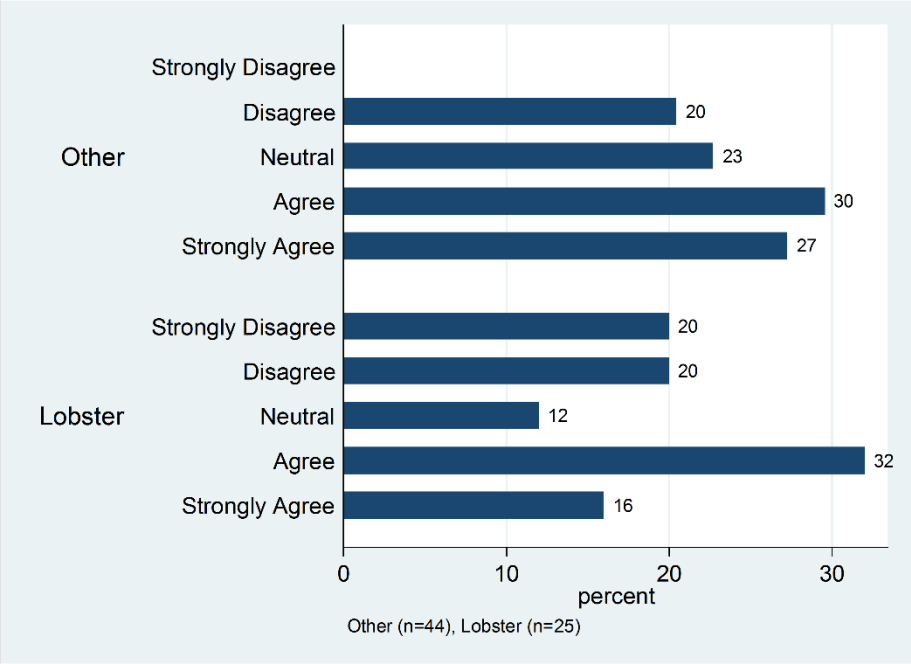

Figure 19. "The amount of fish I caught under management regulations in 2012 was too low because it did not cover my investment in my boat" by primary fishery.

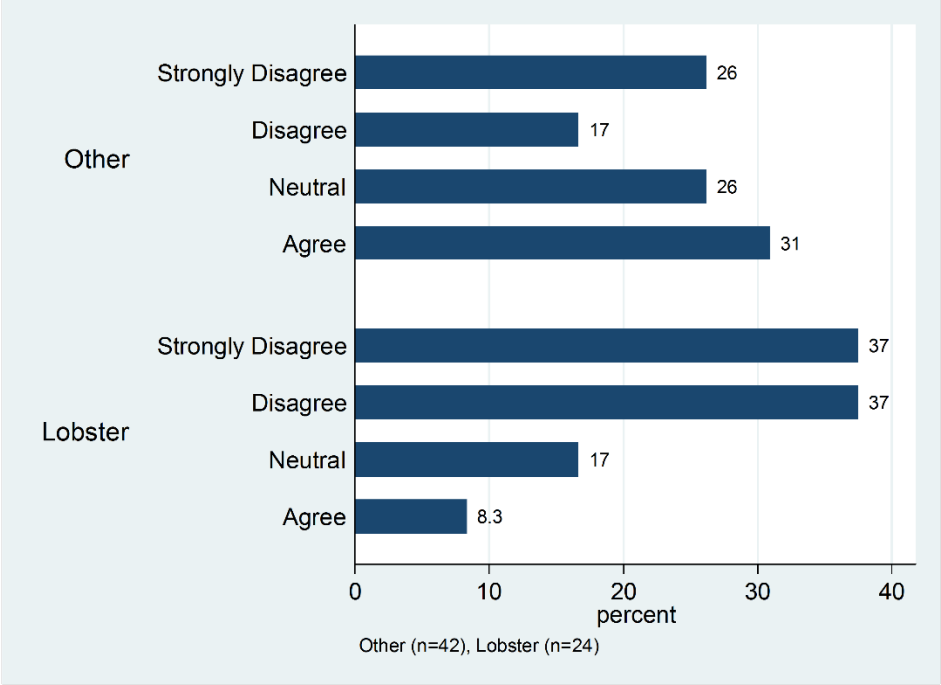

Figure 20. "It would be fairer if everyone could catch the same amount of fish each year" by primary fishery.

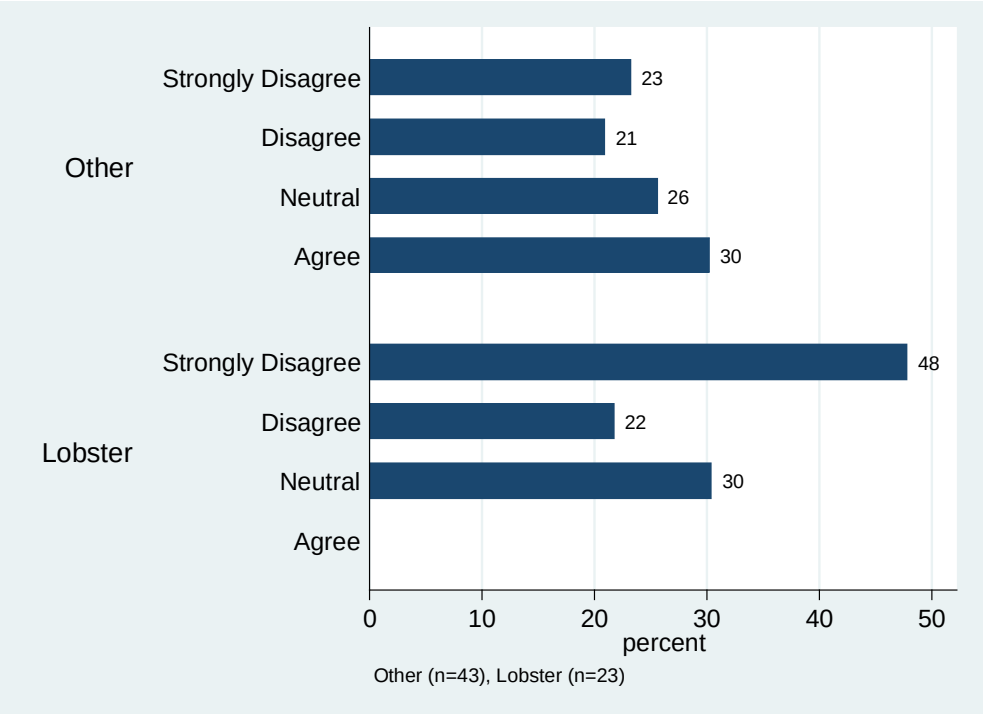

Figure 21. "Restrictions on the amount of fish I was allowed to catch in 2012 were unfair because I needed to be able to catch more in order to sustain my livelihood as a fisherman" by primary fishery.

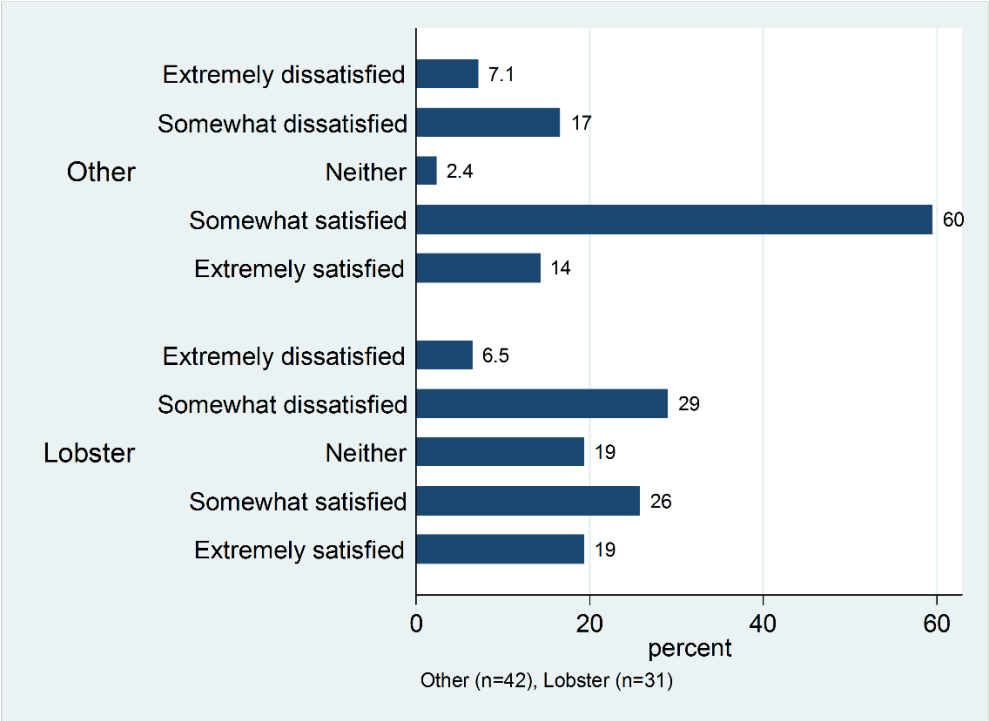

Figure 22. Respondents' level of satisfaction with their physical health by primary fishery.

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Authors must submit separate digital files of the manuscript text, tables, and figures. The manuscript must have cleared NEFSC's online internal review system. Non-NEFSC authors who are not federal employees will be required to sign a "Release of Copyright" form.

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Publications and Reports of the Northeast Fisheries Science Center

The mission of NOAA's National Marine Fisheries Service (NMFS) is "stewardship of living marine resources for the benefit of the nation through their science-based conservation and management and promotion of the health of their environment." As the research arm of the NMFS's Northeast Region, the Northeast Fisheries Science Center (NEFSC) supports the NMFS mission by "conducting ecosystem-based research and assessments of living marine resources, with a focus on the Northeast Shelf, to promote the recovery and long-term sustainability of these resources and to generate social and economic opportunities and benefits from their use." Results of NEFSC research are largely reported in primary scientific media (*e.g.*, anonymously-peer-reviewed scientific journals). However, to assist itself in providing data, information, and advice to its constituents, the NEFSC occasionally releases its results in its own media. Currently, there are three such media:

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