NOAA Technical Memorandum NMFS-NE-230

doi:10.7289/V52J68S4

An Overview of the Survey on the Socio-economic Aspects of Commercial Fishing Crew in the Northeast

US DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Science Center
Woods Hole, Massachusetts
September 2014

NOAA Technical Memorandum NMFS-NE-230

doi:10.7289/V52J68S4

An Overview of the Survey on the Socio-economic Aspects of Commercial Fishing Crew in the Northeast

by Anna Henry[1] and Julia Olson[2]

[1]Integrated Statistics, 16 Sumner Street, Woods Hole, MA 02543
[2] NOAA Fisheries Northeast Fisheries Science Center, 166 Water Street, Woods Hole, MA 02543

US DEPARTMENT OF COMMERCE
Penny Pritzker, Secretary
National Oceanic and Atmospheric Administration
Kathryn Sullivan, Acting NOAA Administrator
National Marine Fisheries Service
Samuel D Rauch III, Acting Assistant Administrator for Fisheries
Northeast Fisheries Science Center
Woods Hole, Massachusetts

September 2014

Editorial Notes

Information Quality Act Compliance: In accordance with section 515 of Public Law 106-554, the Northeast Fisheries Science Center completed both technical and policy reviews for this report. These predissemination reviews are on file at the NEFSC Editorial Office.

Species Names: The NEFSC Editorial Office's policy on the use of species names in all technical communications is generally to follow the American Fisheries Society's lists of scientific and common names for fishes, mollusks, and decapod crustaceans and to follow the Society for Marine Mammalogy's guidance on scientific and common names for marine mammals. Exceptions to this policy occur when there are subsequent compelling revisions in the classifications of species, resulting in changes in the names of species.

Statistical Terms: The NEFSC Editorial Office's policy on the use of statistical terms in all technical communications is generally to follow the International Standards Organization's handbook of statistical methods.

Internet Availability: This issue of the NOAA Technical Memorandum NMFS-NE series is being published as a Web document in PDF format and can be accessed at: http://www.nefsc.noaa.gov/publications/.

Editorial Treatment: To distribute this report quickly, it has not undergone the normal technical and copy editing by the Northeast Fisheries Science Center's (NEFSC's) Editorial Office as have most other issues in the NOAA Technical Memorandum NMFS-NE series. Other than the four covers and first two preliminary pages, all writing and editing have been performed by – and all credit for such writing and editing rightfully belongs to – those so listed on the title page.

TABLE OF CONTENTS

1. INTRODUCTION

The design and implementation of the "Survey on the Socio-Economic Aspects of Commercial Fishing Crew in the Northeast and Mid-Atlantic" (hereafter referred to as Crew Survey) is part of several new and ongoing data collection efforts to support the social scientific investigations of the region's fisheries.[1] Not only does it target a hard-to-reach population of fishermen, it presents a structured opportunity for these fishing participants to voice their perceptions, concerns, and ideas about fisheries management. The survey began in the autumn of 2012, lasted approximately 1 year, and interviewed over 400 fishermen. This document provides an overview of the survey's background and objectives, including the development of the survey, the means of its implementation, and a synopsis of basic data summaries over the range of questions asked. A companion survey of permit holders, the "Survey on the Socio-Economic Aspects of Commercial Fishing Vessel Owners in the Northeast and Mid-Atlantic" (Owner Survey), was implemented approximately a year later and will be detailed in a later document.

2. BACKGROUND

The Social Sciences Branch (SSB) of the NOAA Fisheries Northeast Fisheries Science Center (NEFSC) began development of both the crew and owner surveys in 2010 to address data gaps in newly developed social and economic performance measures of regional fisheries. These performance measures were developed by SSB staff after a lengthy process of literature and policy review and were refined further through outreach to industry, policy, and academic stakeholders (see Clay et al. 2014). One of the primary goals motivating the development of performance measures was to track trends over time and across different fisheries to provide for improved analysis of the economic and social impacts of proposed regulations and to compare the social and economic outcomes of different regulatory approaches. Five primary components of performance—financial viability, distributional outcomes, stewardship, governance, and well-being—were identified, and a process was undertaken to develop indicators for these performance measures based on both existing data and the development of new data collection (see Clay et al. 2014 for more discussion and definition of performance measures).

The NEFSC has had long-term data collection efforts in the biological sciences for many decades and some collections for more than a century; for example, fishery landings data have been available since the 1800s and early 1900s for some species (Fogarty 1995; Skud 1982; Lange and Palmer 1983), the bottom trawl survey program began in 1963 (NOAA 1988), and observers have been collecting fisheries data since 1972. However, comparable data streams for the social sciences have been lacking, including even basic demographic information about fishery participants. Such information was particularly needed for hard-to-reach populations such as vessel crew, prompting the SSB to develop a number of exploratory research projects before the survey was designed (Mendelson and Joyce 2011; Clay et al. 2014). In short, crew members are an important component of the fishing industry, but rarely attend meetings or participate in the management process (Pollnac et al. 2014), and their interests in the fishery are not always the same as those of owners (Olson 2011). Though their numbers are greater than those of owners,

[1] Subsequent titles of the crew survey will refer to fishing crew in New England and Mid-Atlantic, instead of the Northeast and Mid-Atlantic, following more recent versions of the owner survey. Copies of the survey can be found at http://www.nefsc.noaa.gov/read/socialsci/crewOwnerSurvey.html (accessed July 23, 2014).

very little basic information is available about crew members, and there is no contact information or registry[2] to easily enable their participation in the evaluation and understanding of the fishery management process.

Both the crew and the owner surveys were designed with the expectation that they would be conducted on a regular basis to enable long-term monitoring of the socio-economic aspects of the region's fisheries. This first survey comprises a lengthy set of questions and was fielded in 2 partially overlapping versions, in part because it was hoped that the initial survey would provide the baseline for many important social and economic variables that had not been collected on such a scale before. The lengthy, 2-version survey was also designed with the expectation that statistical analyses, such as principal component analysis, would be performed to determine which questions provided the most explanatory power for the different performance measures. In the future, a single, shorter survey will be developed that includes the most effective questions based upon this analysis.

3. METHODS

3a. Survey Instrument Development

Survey development drew upon the experience of other surveys that had been pretested on a smaller sample of regional fishermen. These included 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), a social capital survey of regional groundfishermen conducted in 2010 (Holland et al. 2010), and a regional job satisfaction and well-being survey (Pollnac et al. 2014).

Most survey questions are linked to the 5 performance measures listed above. Additional questions span basic demographic information, as well as questions about the primary ports and fisheries in which respondents were engaged. With such contextual information, survey answers can be used not only to gauge the performance of specific fisheries and the demographic composition of the fishing industry over time, but also for analysis in future Social Impact Assessments for Fishery Management Plans.

Financial viability questions covered household dependence on fishing (Q4) and the extent of family involvement in the industry (Q5, Q17).[3] These questions supplement the types of questions asked in the SSB cost surveys (see Das 2013a, 2013b) by focusing on the household, as well as being directed toward the specific experiences of crew. If the survey is repeated over time, trend data will make it possible to track changes in family involvement in fishing, a traditional identity marker of regional fishing, which may also have concomitant distributional and well-being impacts (Clark 1988; Danowski 1980; Dixon et al. 1984; Doeringer et al. 1986; Miller and Van Maanen 1982).

Distributional outcomes questions cover trip length (Q8), crew size (Q9), hours worked (Q10), the payment system used (Q12-15), work duties (Q16, 18, 19), changes in fishing

[2] The New England Fishery Management Council discussed the creation of a crew permit requirement for the Northeast Multispecies fishery in 2000 during the early stages of development of Amendment 13. Because of reluctance from the National Marine Fisheries Service (NMFS) regarding the administrative burden such a requirement would impose, a formal management alternative was never fully developed (Eric Thunberg, personal communication, July 16, 2014).

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

opportunities (Q20-23), and operator-ownership (Q11). Studies have consistently shown that labor arrangements are a key marker of social relations in a fishery, which may change in response to particular regulations with ensuing distributional consequences (Bradshaw 2004; Brandt and Ding 2008; Eythórsson 1996; Guyader and Thébaud 2001; McCay et al. 1995; Pinkerton and Edwards 2009).

Stewardship was captured by questions about levels and changes in bycatch and discards (V2 Q27-28) and attitudes about fishing and the natural environment (Q28). While the connection between catch shares and stewardship per se has been mixed (Costello et al. 2008; Essington et al. 2012; Gilmour et al. 2012), perceptions about resource health indicate the conditions that fishermen experience in the water may help to foster adaptive management (Biggs et al. 2010), and relate to the perceived legitimacy of regulation (Pinkerton and John 2008).

Governance questions span participation (Q25), trust and equity in decision-making (Q26-Q27), effectiveness and understandability of regulations (V2 Q-25), and goals and adaptability of fisheries management (V2 Q26). As studies in collaborative and comanagement have found, the ability to participate in management decisions in a meaningful way is integral to perceptions of the legitimacy of the regulatory process and can also enhance the design and effectiveness of management so that decisions better match local 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).

Well-being questions cover commitment to fishing as a livelihood (Q29-31), job satisfaction (Q32-34), and health insurance coverage as an indicator of vulnerability (Q35-38). These questions concern the nonmonetary utility and value that participants derive from their occupation and will enable changes in these metrics to be tracked to regulatory adjustments and other factors (Pollnac et al. 2006).

3b. Implementation

Given the lack of registry for crew in the region, the crew survey utilized an in-person intercept form of interviewing. Prior to beginning sampling, the SSB conducted outreach efforts, including interviews with trade magazines and local newspapers, presentations at regional management councils, and meetings with industry liaisons to increase awareness of these survey efforts within the fishing community. Random sampling of ports from Maine to North Carolina occurred between October 2012 and September 2013, based on a stratified sampling design that considered the seasonality of activity level and geographic diversity in the region's fisheries. The ports accounting for the most completed surveys are (in order of number of respondents), Newport News, VA; Gloucester, MA; New Bedford, MA; Cape May, NJ; North Kingstown/Point Judith, RI; Portsmouth, NH; Rockland, ME; Portland, ME; Montauk, NY; and Wanchese, NC. Crew members were approached and interviewed on the docks. Survey data were entered with a Nook tablet computer during the interview. (The owner survey, by contrast, was a mail-based survey, stratified by fishery, utilizing owner permit information to create the sampling frame).

The population of crew in the region was estimated to be around 30,000. This number was derived from work that SSB has done with IMPLAN[4] that uses reported fishing employment

[4] IMPLAN (Minnesota IMPLAN Group, 2008 IMPLAN System (data and software), 1725 Tower Drive West Suite 140, Stillwater, MN 55082 www.implan.com). IMPLAN data have been used by SSB to generate input/output models and model regional economic impacts (see Steinback and Thunberg 2006).

from the Quarterly Census of Employment and Wages (information from reports filed by employers subject to unemployment compensation laws, both state and federal)[5] and Regional Economic Information System data[6] that include those who are self employed. Given an estimated population of 30,000, SSB calculated a projected sample size of 1,330 with the intent of balancing both cost and accuracy of data that could be obtained with the number of samples collected. To set sample size, the SSB used tabulations from power analysis calculations in Cohen (1998) for sample size for detecting difference in mean values between 2 samples. SSB set levels of precision at the fishery level because this is the unit with which comparisons would be made. With a power (probability of correctly rejecting a false hypothesis) of 80% and an estimated precision of 0.36 – 0.37 units on a 5 point scale (for Likert scaled questions), the SSB selected a sample size of 75 units per stratum (fishery). In other words, a sample of 75 creates an 80 percent chance that a change of 0.36 – 0.37 units on a 5 point scale in the sample (for a specific fishery) will be detected as a statistically significant change if the change actually occurred in the population. However, less precise information is needed for some strata, resulting in a sample size of less than 75 for these strata. These included crew in the non-federally managed fisheries. SSB determined that data were needed from these categories but not at the level of precision needed for other fisheries. For these, SSB determined that a precision of 0.5 units on the 5 point scale was sufficient. Finally, SSB adjusted these sample size estimates by using the finite population correction. The sample size of individual fisheries was summed, resulting in the calculated sample size of 1,330 (Table 1).

The survey was completed in its entirety by 359 crew members. An additional 42 began the survey but were unable to complete their interviews. A total of 654 crew members refused the survey, resulting in a response rate of just over 34% completing the entire survey, with an additional 4% completing a portion of the survey.

Many barriers to sampling commercial fishing crew were encountered during the implementation of the survey related to both the availability of eligible respondents and the willingness of crew to participate; only 1,203 eligible contacts were made,[7] fewer than the target sample size of 1,330. Given limitations on the number of interviewing personnel visiting a given port, the number of intercepts per visit was constrained. However, even with port revisits the population of eligible commercial fishing vessel crew was still often limited and was exhausted more quickly than anticipated. One hypothesis was that this issue would be more pronounced in ports with trip boats (i.e., fishermen absent on fishing trips lasting multiple days with longer stay-overs in port) and rotating crew (where crew fish on multiple vessels); however, preliminary analysis of the survey data concluded that the response rate in a port was not related to the average trip length or number of vessels crew work on in a year in that port.

One difficulty with the intercept method was that available personnel on the docks were often not crew members, but rather painters or welders working on vessels (a total of 914 people contacted at the docks were not eligible crew members). Additionally, crew members are most likely present at intercept points when vessels arrive at or leave port, which often occurs during odd hours or on random schedules that are difficult to overlap with interviewers. In an attempt to

[5] Data collected by the Bureau of Labor Statistics. See http://www.bls.gov/cew/ (accessed February 10, 2015).
[6] Data collected by the Bureau of Economic Analysis. See http://www.bea.gov/regional/ (accessed February 10, 2015).
[7] Including 654 refusals, 401 complete/partially complete interviews, 120 missed potential interviews—eligible contacts that did not refuse but did not complete surveys, and 28 contacts that were eligible but did not complete a survey because of language barriers.

increase the number of responses, sampling methodology was revised midway through the sampling season to include additional ports that were not initially selected through random sampling. Also, in addition to random intercepts, interviewers or port liaisons began to arrange meetings in advance for times when vessels were scheduled to be in port.

While limited availability of eligible crew members was an impediment to larger sample sizes even when eligible participants were available, many were not willing to complete an interview. Some vessel owners had specifically instructed their crew not to participate in National Marine Fisheries Service (NMFS) survey efforts. In the absence of specific restrictions from owners, many crew members were uneasy about taking time to respond to a survey while working or were anxious to leave the dock quickly when their shift was over. A total of 120 potential interviews were missed because these eligible crew members were otherwise occupied while interviewers were at the docks. Anecdotally, crew members were more likely to complete the survey with express support and encouragement from the captain. Additional sampling barriers included language differences (see section 4a) and difficulties surveying in bad weather when crew were most likely to be in port. A definite constraint on the response rate was also the length of the survey, which took some respondents over an hour to complete (average completion time was just over 37 minutes). Many crew members would disappear at the sight of interviewers, particularly if a coworker was actively completing a survey. This was likely related to the significant time investment the survey required. A reduction in survey length, as discussed later, might help increase the response rate, as might other changes such as increased follow up with potential interviewees by phone surveys and increasing the number of ports sampled rather than the number of return visits per port.

4. RESULTS AND DISCUSSION

The crew survey provides useful baseline information for an underrepresented segment of the commercial fishing industry. More robust analysis, as described later, will help inform the implementation of the survey on a consecutive 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.

4a. General/demographics

Primary ports of respondents were widely distributed from Maine to North Carolina (Figure 1). Respondents most commonly referred to scallop (28%), groundfish (25%), and lobster (19%) as their primary fisheries (Figure 2). When possible, results are analyzed by these fishery groups. Many other fisheries were represented but because of smaller sample sizes, results are not divided further.

Across fisheries, most respondents were either married or had never been married (Figure 3). There are slightly more respondents from the lobster fishery who have never been married and fewer who are currently married, although this is not a statistically significant difference. This may be related to the younger age distribution of respondents whose primary fishery is lobstering (Figure 8).

A majority of the respondents (60%) across fisheries had an education level of a high school diploma or the equivalent. However, there were statistically significant differences in education levels between fisheries (χ^2=17.71, df=6, p<0.01). Participants in the lobster fishery

had generally completed higher levels of education, with 35% completing a 2 or 4 year degree compared to 27% across all other fisheries (Figure 4).

A large majority (85%) of crew members interviewed described themselves as white (Figure 5). However, the number of self-identified ethnic groups reflects a population with a more diverse ethnic heritage (Figure 6).

Attempts were made to hire interviewers that spoke languages most commonly associated with crew in the region (including an interviewer fluent in Portuguese and Spanish who worked in Point Judith, RI, and New Bedford, MA, and a Spanish-speaking interviewer assigned to Maine). Paper copies of the survey were available in English, Spanish and Portuguese, so it is unsurprising that these languages were the most common responses to the question, "what is the primary language you speak at home?" In fact, the vast majority (90%) reported English as their primary language (Figure 7). Nevertheless, 28 potential respondents were ineligible because of language barriers.

Crew member ages range from 16 to 75 years of age across all fisheries, with the average age by fishery between 35 and 41 years of age (Table 2). This is considerably older than commercial fishing crew in the North Pacific, for example, who from 1993-2003 had a mean age of 30.2 (Carothers and Sepez 2003). However, mean age was increasing in the North Pacific during the time period studied, an increase attributed to a decrease in crew sites that may have created more favorable hiring conditions for more experienced (and likely older) crew. Trend data over time will help determine the extent to which similar processes may be operating in the Northeast, where the first year of survey data detected a significant difference in age distribution between fisheries (Kruskal-Wallis, p-value<0.01). This is particularly noticeable in the lobster fishery, which has a much younger age distribution (Figure 8).

Understanding changes in the age distribution is important, as one commonly recognized threat to the future of commercial fishing is the aging population of fishermen and the lack of new entrants into the fishery (Tuler et al. 2008). It is difficult to determine if this trend is supported from 1 year of data; however, given the average respondent was 39 years old and had been involved in fishing for over 18 years, it appears this may be a legitimate concern (Table 2, Table 3). Both the average age and number of years fishing were slightly lower for respondents in the lobster fishery. This may be related to regulatory structures that encourage young entrants to the fishery, such as the student license system in the state of Maine (40% of respondents in the lobster fishery were from Maine).

4b. Financial Viability

The distribution of annual fishing income by $10,000 bins separated into hired captains and all other crew can be seen in Figure 9. In all fisheries combined and in the lobster fishery in particular, $30,000-39,999 was the most common income range for other crew. For these fisheries, this range also equaled the average estimate of annual income in their next best alternative occupation (annual income if they were not fishing). For groundfish participants, annual income of noncaptain crew was slightly higher, with 23% listing $30,000-39,000 and 23% listing $40,000-49,999 as their annual income. The largest percent of noncaptain crew in the scallop fishery estimate their annual income to be $40,000-49,000. Across fisheries, hired captains report higher incomes than other crew although sample sizes of hired captains are much smaller.

On average, respondents listed their next best alternative income to be lower than their actual fishing income. The fact that respondents' average annual fishing income was equal to or

greater than their estimated income from their next best alternative occupation across all fisheries suggests crew members are at least as financially successful as they would be in other professions and may not possess the same level of skill or experience in other professions as they do in fishing. One caveat to these results is the potential for respondent bias to underestimate their next best alternative income, thus demonstrating higher financial dependence on fishing for fear future regulatory changes may cite lack of dependence on fishing and available income alternatives as rationale for reducing fishing opportunities. This bias is difficult to estimate and depends largely upon how the respondent perceives the question and how results may be used. However, 92% of respondents listed fishing as their most important household income, providing an average of 87% of the total household income, indicating a high level of financial dependence on fishing and low reliance on alternative income sources.

Annual fishing income was much higher for participants in the scallop fishery. This may be related to the generally high exvessel value of scallops and the relatively large economic contribution of scallops (NMFS 2014). It is important to note that these are *annual* income levels and do not take into account any metric of effort such as hours worked per year. Respondents in the scallop fishery indicated the longest average trips and longest hours worked per day, which may correspond to higher overall levels of fishing income. However, this relationship is difficult to determine without more specific information regarding annual fishing effort.

Crew members across all fisheries, on average, have been fishing between 15 and 20 years. Moreover, over half had family involved in fishing, for an average of around 2 generations (Table 3). Similarly, the disaster aid survey conducted in 2000—whose respondents matched "the region's active core of medium-sized, limited-access, groundfish fishermen" (Olson and Clay 2001)—found that nearly half of owners and crew had fathers and grandfathers who were fishermen (ibid). Spouses or other family members of these owners were also involved in all aspects of fishing business, as well as nonfishing employment (ibid).

4c. Distributional Outcomes

For all fisheries combined, the average size of crew was 3.8 people, and the average trip length was 4.7 days. Average crew size and trip length was lower for groundfish and lobster and higher for scallops. On average, crew members worked 14.6 hours per day. For those in the lobster fishery, average days worked were 4 hours fewer, while those in groundfish and scallops work approximately 2 more hours per day (Table 4). With trend data over time, the distributional implications of these variables may become clearer. For instance, Georgianna and Shrader (2008) found in New Bedford that hours worked tended to increase as crew sizes fell.

Across all fisheries, over 70% of respondents found it either "very easy" or "easy" to find their 2011 employment on a fishing vessel (Figure 10). Respondents who were new to their vessel in 2011 reported having more difficulty finding employment than those who had been on their vessel more than one year (χ^2=18.11, df=4,p=0.001); however, a majority of those new to the vessel still reported it being "easy" or "very easy" to find employment (Figures 11 and 12). Only 22 respondents had been involved in fishing less than one year, therefore differences in difficulty for crew members who were entirely new to fishing was difficult to determine. Across all fisheries, almost 40% of respondents were hired based on previous work with the same vessel, or utilized other important social networks to find work, such as referrals from friends, word of mouth, or kinship to the owner (Figure 12). Such reliance on social networks demonstrates the continuing importance of community and kinship in the region's fisheries but

also suggests that employment may be difficult for new entrants who lack social connections to the fishing industry.

For all fisheries, over 80% of all respondents listed their first position on their vessel as a deck hand, while only 2% started as captains. When referring to their current position on the vessel, deck hands drop to 61% and the position of captain rises to 18%. This trend of upward mobility is demonstrated to varying degrees in each of the fisheries (Figure 13) and is related to both age and number of years involved in fishing as older, more experienced crew members were more likely to have advanced their position on the vessel. Traditionally, a common pattern in small-boat or family-based fishing has been a career path beginning as a deckhand and moving gradually to captain and vessel owner (Peterson 1981). With increasing consolidation in the industry and other factors, such traditional movements may be on the decline. Trend data over time will be needed to better substantiate that change; however, it is important to remember that the crew survey only includes hired captains; additional information from the owner survey will be needed to fully trace the extent of or any changes in the traditional path from crew member to owner.

A slight majority of vessels for all fisheries combined and in the groundfish fishery were owner-operated, while just less than one third of all scallop vessels were owned by the captain (Figure 14). This percentage rises to 95% of the lobster industry vessels. This higher level of owner-operation in lobster compared to other fisheries may be partially attributed to regulatory requirements for owner-operation of lobster vessels operating in Maine state waters, given that 40% of respondents in the lobster fishery were from Maine. The vessel cost survey, on the other hand, found that 81% of respondents in 2007 and 71% of respondents in 2008 were owner-operators (Das 2013a). The difference could be due to a change in the number of owner-operators since the 2007 cost survey; or crew on vessels with hired captains could be overrepresented in the crew survey sample if respondents were more likely to take the survey without an owner present. Continuous survey results over time may help to better understand these trends.

A share system is by far the most common system of payment, with over 75% of respondents in all fisheries paid by this method (Figure 15). These results are similar to the cost survey data, which found 73% and 77% respondents used a share system of payment, in 2007 and 2008 respectively (ibid). Of those receiving share payments, the largest portion paid to the crew is in the scallop fishery (52%), while the smallest is in the lobster fishery (28%); it is important to note, however, that the total payment for crew members is related not only to the share but also to what expenses they are responsible for covering and whether these expenses are deducted before or after the shares are divided (i.e., a broken or clear lay). Variations in share percentages may also be due to differences in crew sizes, as fisheries with larger average crew size were correlated with larger crew shares. Similarly, smaller crew shares are associated with vessels that are owner operated (and thus have smaller numbers of crew because the captain is not considered a crew member). This correlation between vessel owner status and percentage of share to the boat and crew is also exhibited in the cost surveys where in 2008 average crew share was 40% to owner operated vessels and 51% to those operated by a hired captain (Das 2013a). A majority of vessels with hired captains also reported that captains received additional compensation ranging from a percentage (most commonly 5-10%) of net or gross revenue on top of their crew share or an additional crew share.

Fuel, food, groceries, bait, gear, and ice were the most common items listed as expenses that crew members were at least partially responsible for paying. Only 8.6% of respondents said

there were new expenses passed onto crew in 2011. The largest portion of these respondents (3% overall) were members of groundfish sectors, who primarily listed costs for leasing fish or other sector-related expenses, a change found in other fisheries that have moved to catch shares (Olson 2011).

4d. Stewardship

Survey indicators demonstrate relatively high levels of stewardship, with crew reporting relatively low levels of bycatch, discards, and highgrading across all the fisheries. Respondents whose primary fishery is groundfish perceived slightly higher levels of bycatch in their fishery (this difference was not statistically significant) while respondents involved in the scallop and lobster fisheries perceived lower levels of bycatch. These differences likely stem from differences in gear and the multispecies nature of the groundfish fishery. Those in the lobster fishery perceived higher and increasing discards (Figure 16), which though statistically significant (χ^2=13.28, df=4, p=0.01, χ^2=29.8, df=4, p<0.01), is likely due to regulations that restrict the catch of lobsters to a particular size range and prohibit the retention of egg-bearing females and lobsters with v-notches (indicating a female was recently gravid). Respondents involved in groundfishing more frequently responded that discard levels were decreasing (Figure 17), a decrease that was expected with the introduction of catch shares given higher levels of discarding associated with the former days–at-sea (DAS) management system (Grimm et al. 2012, Mendelson and Joyce 2011).

Respondents agreed that fishermen have a responsibility to participate in the management process, showing little variation by fishery. Responses consistently indicated high levels of stewardship for the resource regardless of primary fishery (Figure 18).

4e. Governance

While a majority of respondents agreed that fishermen have a responsibility to participate in the fisheries management process, far fewer had ever participated in any aspect of federal fisheries management (such as attending meetings, writing letter, or serving on a committee). Of the 214 respondents, 66% had not “ever participated in any aspect of federal fisheries management” (Table 5). Those respondents who had participated in management generally displayed low levels of satisfaction with their involvement in the management process. The exception to this was the participants in the lobster fishery who, on the whole, viewed their involvement as more welcome and effective than respondents from other fisheries (Figure 19). Similarly, those involved in the lobster fishery generally displayed higher levels of trust and equity in the decision-making process than respondents from other fisheries (Figure 20). Those in the scallop industry also perceived the management process slightly more positively, while the perceptions of those in the groundfish industry were consistently more negative (Figure 20). Responses to comparative questions in the owner survey will be able provide insight into the extent of differences between crew and owners in terms of representation and participation, and thus how the increasing interest in comanagement or other devolved forms of management are developing in the region.

Responses to questions regarding effectiveness and understandability of regulations (Figure 21) and goals and adaptability of management (Figure 22) followed the same general trend of higher levels of satisfaction and more positive perceptions of management in the lobster fishery and scallop fishery. Likewise, these questions also demonstrated more dissatisfied, negative perceptions of management in the groundfish fishery than in the other fisheries.

Governance results aligned with previous studies that have demonstrated mistrust of management in the groundfish fishery (Acheson and Gardner 2011; Holland et al. 2010). Additionally, significant reductions in allowable groundfish catch for fishing years 2012 (May 2012-April 2013) (Murphy et al. 2014) and 2013 (May 2013-April 2014) had considerable impacts on the groundfish industry, prompting the Secretary of Commerce to declare the Northeast Groundfish Fishery a disaster for fishing year 2013 (NOAA 2012). These management actions occurred during the implementation of the survey, likely negatively impacting participants' perceptions of governance in the groundfish fishery further. Respondents involved in the lobster and scallop fisheries, on the other hand, showed higher levels of satisfaction and more positive perceptions of management. This may be related to the more positive economic and stock status of these fisheries (NMFS 2014, 2012) as well as the less contentious state of management. Additionally, the long history of comanagement and inclusion of industry in the lobster fishery in the state of Maine (over 40% of respondents from the lobster fishery were from Maine) may contribute to their positive perceptions of federal management. Lobster is also managed with parametric strategies (minimum and maximum sizes, protections of reproductive females) that are often supported by fishermen (Acheson and Wilson 1996; Acheson and Steneck 1997).

4f. Well-being

The crew survey measured 3 aspects of well-being: health insurance as a factor of vulnerability, commitment to fishing as a livelihood, and job satisfaction.

Lack of health insurance is an important indicator of vulnerability (Tuler et al. 2008) and can be used to identify populations who are particularly at risk to impacts from changes in a fishery. For all respondents, 59% reported having health insurance (Figure 23). This percentage was higher in the scallop and lobster fisheries (65% and 61%, respectively). While it was as low as 54% in the groundfish fishery, this is substantially higher than levels reported in a 2001 survey where only 44.8% of groundfish crew members reported having insurance (Olson and Clay 2001). Although coverage has increased, the continued lack of coverage is troubling, particularly considering a report from the National Institute of Occupational Safety and Health that found the Northeast multispecies groundfish fishery was the most hazardous fishery in the United States based on fatality rates from 2000-2009 (Lincoln and Lucas 2010). These results leave 41% of respondents without insurance, indicating that many crew and their families are in a vulnerable economic position; however, it should be noted that coverage has increased during a recession when such expenses are more often eliminated. Over 80% of respondents with health insurance either purchased their own private insurance, received their insurance from a spouse or partner's place of employment, or were insured through a federal or state insurance program. (Although the relative contribution of these sources varied by fishery, they were overwhelmingly the most common sources of insurance.) Very few respondents (4% across all fisheries) received insurance from their employer (the vessel owner). At least 80% of respondents with insurance had coverage that included themselves, their spouse, and their children.

Responses to questions regarding job satisfaction and commitment to fishing as a livelihood do not differ dramatically by fishery (Figure 24). Generally, respondents did not identify themselves as leaders in their respective fisheries or communities: only 19% and 33% across all fisheries agreed or strongly agreed that they were leaders, although a significantly higher percentage (41%) of scallop fishermen felt they were leaders in their fishery (χ^2=12.29, df=4, p=0.02). While job satisfaction in fishing tends to be correlated with being in control of

one's job (Gatewood and McCay 1990), other studies have demonstrated that crew may score low in control and still feel highly rewarded by other aspects of fishing (Pollnac and Poggie 2006). Likewise, while respondents did not recognize themselves as leaders, an indicator of the ability to control or direct one's profession, they demonstrated a strong attachment to the occupation of fishing and social networks with other fishermen. An overwhelming majority of respondents are proud to identify themselves as fishermen, enjoy fishing, and feel strong connections to other fishermen in their communities. Respondents generally do not consider fishing to be "just a job;" however, about half have considered leaving the fishing industry. This percentage is lower for those in the lobster fishery, with only 40% considering leaving, although this is not a statistically significant difference.

Indicators of job satisfaction demonstrate more dissatisfaction in the groundfish fishery than in other fisheries, particularly related to earnings, predictability of earnings, and job safety (Figure 25). Scallop fishermen are more satisfied with the predictability of earnings and less satisfied with the physical fatigue of the job, while lobstermen are more satisfied with the amount of time spent away from home and the healthfulness (how the job impacts physical and mental health) of the job. Across fisheries, high levels of satisfaction are demonstrated in relation to the unique characteristics associated with fishing as a profession, such as the adventure and challenge of the job (91% and 88% were satisfied or strongly satisfied) and the opportunity to be your own boss (66% were satisfied or strongly satisfied). These aspects of job satisfaction have been shown to be important in numerous studies (e.g., Pollnac and Poggie 1988, 2006), demonstrating the importance of noneconomic aspects of fishing and the difficulty for those involved in fishing to find alternative occupations with comparable levels of satisfaction if they are displaced.

Over three-fourths of respondents in all fisheries were satisfied or extremely satisfied with their life and their physical health (Figure 26). More divergence was demonstrated in satisfaction with the health of the marine environment, with 64% satisfied across all fisheries, and 63% in the lobster fishery, compared to 80% in the scallop fishery and only 38% in the groundfish fishery. This difference is likely related to the differing stock status of each fishery (NMFS 2012).

Respondents reported high levels of happiness overall (79% were happy either all the time or often), although this was the case for only 66% of crew members involved in groundfishing (Figure 27). This question has been linked to individual well-being (Pollnac et al. 2014) though respondents often reacted with confusion to this question and found it difficult to realistically assess.

Across all fisheries, just under half of respondents would advise a young person to enter fishing. While this number rises to 57% in the scallop fishery and 63% in the lobster fishery, only 22% of respondents in the groundfish industry would recommend fishing to a young person (statistically significant, $\chi^2=31.1$, df=2, $p<0.001$) (Figure 28). This question has also been used in previous studies and has proven a useful indicator of respondents' perceptions of the future of the industry.

While many independent variables, for example, age, marital status, and years in the fishery, may also be related to job satisfaction and are not explored further in this analysis, the question of whether or not someone would enter the same occupation again if living their life over has also been used in numerous studies and has been identified as the single most informative question regarding job satisfaction (Robinson et al. 1969). Despite varying results from other indicators of job satisfaction and happiness, 74% of all respondents would still be

fishermen again if they had to live their lives over, and this level was almost identical across groundfish, scallops, and lobster (Figure 29).

5. LESSONS LEARNED AND FUTURE STEPS

This crew survey provides new, critical information that is useful for understanding the attitudes, impacts, and issues of concern to commercial fishing crew in the Northeast. Crew members, though little studied, represent a majority of the participants in commercial fisheries and are vulnerable in many ways. As this survey demonstrates, crew members rarely participate in the management process, display a high level of mistrust in management, and often feel as though their opinions are irrelevant. Additionally, many crew members do not have access to health insurance and are unsatisfied with the predictability of their earnings. Despite these challenges, respondents exhibit a high level of attachment to fishing as an occupation and satisfaction with the noneconomic aspects of fishing as a career.

In addition to the results of the survey, the data collection process itself provided a number of important lessons. The estimated response rate of 90% was based on the response rate achieved by a previous survey using similar methods to survey fishermen in the northeast (Pollnac et al. 2014). However, that survey targeted all fishermen, both crew and captains (including both hired and owner captains), and in all regions a majority of respondents (61.9-73.3%) were captains (ibid). The response rate for this crew survey was significantly lower than estimated; moreover, it is possible that the calculated response rate of 38% is itself overstated, given the likelihood that eligible respondents made themselves unavailable while interviewers were on the docks but never officially refused the survey. A lower response rate, when targeting only crew, is understandable given the fact that many crew members need permission from their captains to spend time responding to a survey. Nonetheless, the intercept method that was employed in the survey is a strategy often used to maximize response rates for populations that are hard to locate and is likely the most effective strategy to reach crew members. Additional strategies could be utilized in future years to increase response rates, such as collecting phone numbers to follow up with eligible respondents and distributing survey packets that could be returned by mail.

There are plans for future statistical analysis using principal components analysis to determine the variance, and therefore the explanatory power, associated with individual questions relative to their linked indicators. Additional analysis will also examine to what degree survey respondents began to repeat responses to the Likert scale questions (questions that asked respondents to rate levels of agreement or disagreement) because of disinterest or fatigue as they progressed through the questions in the survey instrument. The results of these analyses will be used to eliminate questions with minimal contribution to understanding the human dimensions of regional fisheries, with the goal of a single, simplified, and shorter version of the survey to be used in future data collection efforts. After revisions are made and a final version of the survey is established, it is important to minimize future changes to the survey instrument to ensure a consistent time series of data and comparison of results across years. Index scores will be developed from the final version of the survey to quantitatively track changes over time. Future data collection is proposed on a 3 year cycle to balance the need to minimize the burden on respondents and survey fatigue, with the need to ensure a frequency of data collection that can effectively capture changes in attitudes, values, and demographics.

6. ACKNOWLEDGEMENTS

The authors would like to thank the numerous people who have contributed to the design and implementation of and participation in the crew survey. Many thanks are due to the fishermen, who took the time to fill out the survey, many of whom went to great lengths to provide thoughtful answers to questions and suggest ways to improve the survey. Thanks are also due to members of the Social Sciences Branch who helped develop the survey instrument, participated in outreach efforts, and provided comment on drafts of this paper, especially Patricia Clay, Lisa Colburn, Andrew Kitts, Matthew McPherson, Tammy Murphy, Patricia Pinto da Silva and Eric Thunberg. Finally, acknowledgement is due to NOAA's Coastal Services Center, the Eastern Research Group, and QuanTech (including Lou Nadeau, David Cox, Brielle Kissel, Dave Loomis, Andreas Lord, Shona Paterson, Richard Pollnac, Daemian Schreiber, and Sarah Young) for their support in the design, sampling strategy and implementation of the survey.

7. REFERENCES CITED

Acheson JM, Gardner R. 2011. Modeling disaster: The failure of the management of the New England groundfish industry. North American Journal of Fisheries Management 31(6):1005-1018.

Acheson JM, Steneck RS. 1997. Examining the bust then boom in the Maine lobster industry: the perspectives of fishermen and biologists. North American Journal of Fisheries Management 17:826-847.

Acheson JM, Wilson JA. 1996. Order out of chaos: the case for parametric fisheries management. American Anthropologist 98(3): 579-594.

Biggs R, Westley FR, Carpenter SR. 2010. Navigating the back loop: fostering social innovation and transformation in ecosystem management. Ecology and Society 15(2): 9. [online] URL: http://www.ecologyandsociety.org/vol15/iss2/art9/

Bodin Ö, Crona BI. 2009. The role of social networks in natural resource governance: what relational patterns make a difference? Global Environmental Change 19: 366-374.

Bradshaw M.(2004. A combination of state and market through ITQs in the Tasmanian commercial rock lobster fishery: the tail wagging the dog? Fisheries Research 67(2): 99-109.

Brandt S Ding N. 2008. Impact of property rights on labor contracts in commercial fisheries. Ocean & Coastal Management 51(11): 740-748.

Carothers CSepez J. 2003. Commercial fishing crew demographics & trends in the North Pacific: 1993-2003. Alaska Fisheries Science Center, NMFS, Seattle, WA. Online at https://seagrant.uaf.edu/conferences/fish-com/powerpoints/carothers-handout.pdf (accessed July 23, 2014).

Clark ME. 1988. Managing uncertainty: Family, religion, and collective action among fishermen's wives in Gloucester, Massachusetts, in To Work and To Weep: Women in Fishing Economies, Nadel-Klein J, DL Davis (editors). Social and Economic Papers no. 18, St. Johns: Memorial University of Newfoundland, Institute of Social and Economic Research, pp. 261-278.

Clay PM, Kitts A, Pinto da Silva P. 2014. Measuring the social and economic performance of catch share programs: Definition of metrics and application to the U. Northeast Region groundfish fishery. Marine Policy 44: 27-36.

Cohen J. 1988. Statistical power analysis for the behavioral sciences, 2nd Edition, Hillsdale, NJ: Lawrence Earlbaum Associates Publishers.

Costello C, Gaines SD, a Lynham J. 2008. Can catch shares prevent fisheries collapse? Science 321(5896): 1678-1681

Danowski F. 1980. Fishermen's wives: Coping with an extraordinary occupation. Narragansett: University of Rhode Island Sea Grant Marine Bulletin No. 37.

Das C. 2013a. An overview of the annual cost survey protocol and results in the Northeast (2007 to 2009). US Dept Commerce, NOAA Technical Memorandum NMFS-NE-226, Woods Hole, Massachusetts.

Das C. 2013b. Northeast trip cost data - Overview, estimation, and predictions. US Dept Commer, NOAA Technical Memorandum NMFS-NE-227, Woods Hole, Massachusetts.

Dixon RD, Lowery RC, Sabella JC, Hepburn MJ. (1984) Fishermen's wives: A case study of a Middle Atlantic coastal fishing community. Sex Roles 10(1): 33-52.

Essington TE, Melnychuk MC, Branch TA, Heppell SS, Jensen OP, Link JS, Martell SJD, Parma AM, John G. Pope JG, Smith ADM. 2012. Catch shares, fisheries, and ecological stewardship: a comparative analysis of resource responses to a rights-based policy instrument. Conservation Letters 5(3): 186-195.

Eythórsson E. 1996. Coastal communities and ITQ management: The case of Icelandic fisheries. Sociologia Ruralis 36(2): 212-223.

Fogarty MJ. 1995. Populations, fisheries, and management. in The biology of the American Lobster, Factor J (editor), San Diego: Academic Press, pp. 111-137.

Gatewood JB, McCay BJ. 1990. Comparison of job satisfaction in six New Jersey fisheries: Implications for management. Human Organization 49(1): 14-25.

Georgianna D Shrader D. 2008. The effects of days at sea on employment, income, and hours of work: some preliminary evidence. Human Ecology Review 15(2): 185-193.

Gilmour PW, Day RW, Dwyer PD. 2012. Using private rights to manage natural Resources: Is Stewardship Linked to Ownership? Ecology & Society 17(3): 1. http://dx.doi.org/10.5751/ES-04770-170301

Grimm D, Barkhorn I, Festa D, Bonzon K, Boomhower J, Hovland B, Blau J. 2012. Assessing catch shares' effects evidence from Federal United States and associated British Columbian fisheries. Marine Policy 36(3): 644-657.

Guyader O, Thébaud O. 2001. Distributional issues in the operation of rights-based fisheries management systems. Marine Policy 25(2): 103-112.

Holland DS, Pinto da Silva P, Wiersma J. 2010. A survey of social capital and attitudes toward management in the New England groundfish fishery. US Dept Commerce, Northeast Fish Sci Cent Ref Doc. 10-12.

Jentoft S, McCay BJ, Wilson DC. 1998. Social theory and fisheries co-management. Marine Policy 22(4–5): 423-436.

Jones N. 2010. Environmental activation of citizens in the context of policy agenda formation and the influence of social capital. The Social Science Journal 47: 121-136.

Lange AMT, Palmer JE. 1983. USA historical catch data, 1904-80, for major fisheries associated with Georges Bank. Woods Hole Laboratory Reference Document No. 83-13

Lincoln J, Lucas D. 2010. Commercial fishing deaths: United States, 2000-2009, Morbidity and Mortality Weekly Report, July 16. 59(27):842-845.

McCay BJ, Creed CF, Finlayson AC, Richard Apostle R, Mikalsen K. 1995. Individual Transferable Quotas (ITQs) in Canadian and US Fisheries. Ocean & Coastal Management 28(1-3): 85-115.

Mendelson M, Joyce JG. 2011. New England groundfish crew rapid assessment summary report, CINAR Grant No.NA09OAR4320129 (http://www.nefsc.noaa.gov/publications/reports/NA09OAR4320129.pdf, accessed March 26, 2014).

Miller ML, Maanen JV. 1982. Getting into fishing: Observations on the Social Identities of New England Fishermen. Journal of Contemporary Ethnography 11(1): 27-54.

Murphy T, Kitts A, Records D, Demarest C, Caless D, Walden J, Benjamin S. 2014. Final report on the performance of the northeast multispecies (groundfish) fishery (May 2012 - April 2013). US Dept Commer, Northeast Fish Sci Cent Ref Doc. 14-01; 111 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at http://www.nefsc.noaa.gov/publications/

National Marine Fisheries Service. 2014. Fisheries economics of the United States, 2012. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-F/SPO-137, 175 p. Available at https://www.st.nmfs.noaa.gov/st5/publication/index.html

NOAA 1988. An evaluation of the bottom trawl survey program of the Northeast Fisheries Center. Survey Working Group, Northeast Fisheries Center. NOAA Technical Memorandum NMFS-F/NEC-52. Available at http://www.st.nmfs.noaa.gov/tm/nec_image/nec052image.pdf

NOAA 2012. Secretary of Commerce declares disaster in Northeast groundfish fishery. Sept 13, 2012. Available at: http://www.nmfs.noaa.gov/mediacenter/2012/09/13_secretary_of_commerce_declares_disaster_in_northeast_groundfish_fishery.html

NMFS 2012. Annual report to congress on the status of US fisheries-2012, U.S. Department of Commerce, NOAA, Natl. Mar. Fish. Serv., Silver Spring, MD, 20 pp.

Olson J. 2011. Understanding and contextualizing social impacts from the privatization of fisheries: an overview. Ocean and Coastal Management 54:353–63.

Olson J, Clay PM. 2001. An overview of the social and economic survey administered during round II of the Northeast Multispecies Fishery Disaster Assistance Program. US Dept Commer, NOAA Technical Memorandum NMFS-NE-164, Woods Hole, Massachusetts.

Peterson SB, Smith LJ. 1981. Small-scale commercial fishing in southern New England. WHOI Technical Report 81-72, Woods Hole MA: Woods Hole Oceanographic Institution.

Phillips G, Kriwoken L, Hay P. 2002. Private property and public interest in fisheries management: the Tasmanian rock lobster fishery. Marine Policy 26(6): 459-469.

Pinkerton E. 1989. Cooperative management of local fisheries: New directions for improved management and community development. Vancouver: University of British Columbia.

Pinkerton E, Edwards DN. 2009. The elephant in the room: The hidden costs of leasing individual transferable fishing quotas. Marine Policy 33(4): 707-713.

Pinkerton E, John L. 2008. Creating local management legitimacy. Marine Policy 32(4): 680-691.

Pollnac RB, Abbott-Jamieson S, Smith C, Miller ML, Clay PM, Oles B. 2006. Toward a model for fisheries social impact assessment. Marine Fisheries Review 68(1-4): 1-18.

Pollnac RB, Seara T, Colburn LL. 2014. Aspects of fishery management, job satisfaction, and well-being among commercial fishermen in the northeast region of the United States. Society & Natural Resources, in press.

Pollnac RiB, Poggie JJ Jr. 1988. The structure of job satisfaction among New England fishermen and its application to fisheries management policy. American Anthropologist 90(4): 888-901.

Pollnac RB, Poggie JJ Jr. 2006. Job satisfaction in the fishery in two Southeast Alaskan towns. Human Organization 65(3): 329-339.

Pretty J, Smith D. 2004. Social capital in biodiversity conservation and management. Conservation Biology 18(3): 631-638.

Pretty J, Ward H. 2001. Social capital and the environment. World Development 29(2):209-227.

Robinson J, Athanisou R, Head K. 1969. Measures of occupational attitudes and occupational characteristics. Ann Arbor: Institute for Social Research, University of Michigan.

Skud BE. 1982. Dominance in fishes: The relation between environment and abundance. Science 216(4542): 144-149.

Steinback SR, Thunberg EM. 2006. Northeast regional fishing input-output model, NOAA Tech Memo NMFS NE 188.

Tuler S, Agyeman J, Pinto da Silva P, LoRusso KR, Kay R. 2008. Assessing vulnerabilities: Integrating information about driving forces that affect risks and resilience in fishing communities. Human Ecology Review 15(2):171-184.

Wiber M, Berkes F, Charles A, Kearney J. 2004. Participatory research supporting community-based fishery management. Marine Policy 28: 459-468.

Yochum N, Starr RM, Wendt DE. 2011. Utilizing fishermen knowledge and expertise: Keys to success for collaborative fisheries research. Fisheries 36(12):593-605.

Table 1. Populations and sample sizes, by fishery.

Fishery		Estimated Population	Calculated Sample Size	Actual Sample Size (primary fishery)
Black Sea Bass		506	66	4
Herring and mackerel		509	66	10
Lobster		4,229	75	82
Monkfish		917	70	10
Multispecies, large mesh	common/other	487	65	22
	sector	3,045	75	56
Multispecies, small mesh		281	60	0
Red crab		143	50	0
Scallop, general category IFQ		2,180	75	50
Scallop, general category non-IFQ		3,875	75	11
Scallop, limited access		5,114	75	49
Scup		219	56	2
Skate		290	60	8
Spiny dogfish		341	62	5
Squid, Illex		273	59	3
Squid, Loligo		534	66	10
Summer Flounder		1,563	75	20
Surf clam/ocean quahog		1,084	71	8
Tilefish		132	48	2
Totals		**30,000**	**1,330**	**401**
Expected Response Rate		**90%**		

Table 2. Summary of respondents' age by fishery.

Age	All	Groundfish	Scallops	Lobster
min	16	18	20	16
max	75	75	66	71
median	38	39	41	32
mean	38.6	40.6	40.6	35.2
sd	12.1	14.3	10.8	12.7
n	357	71	99	69

Table 3. History and family involvement in fishing.

Fishery	Avg. yrs fished	% with family involved in fishing	Avg. generations fished
All fisheries	18.2	54%	2.3
Groundfish	17.4	61%	2.9
Scallops	19.7	50%	1.9
Lobster	15.4	51%	2.1

Table 4. Crew and trip information

	Crew Size		Trip Length (no. of 24h periods)		Shift Length (h worked/24h)	
	Average	Median	Average	Median	Average	Median
All fisheries	3.8	3	4.7	3	14.6	15
Groundfish	3.3	3	4.0	3	16.4	15
Scallops	6.1	7	7.7	9	16.7	18
Lobster	2.3	2	1.7	1	10.6	10

Table 5. Respondents who have participated in federal fisheries management.

	All fisheries	Groundfish	Scallops	Lobster
Yes	34%	35%	37%	25%
No	66%	65%	63%	75%

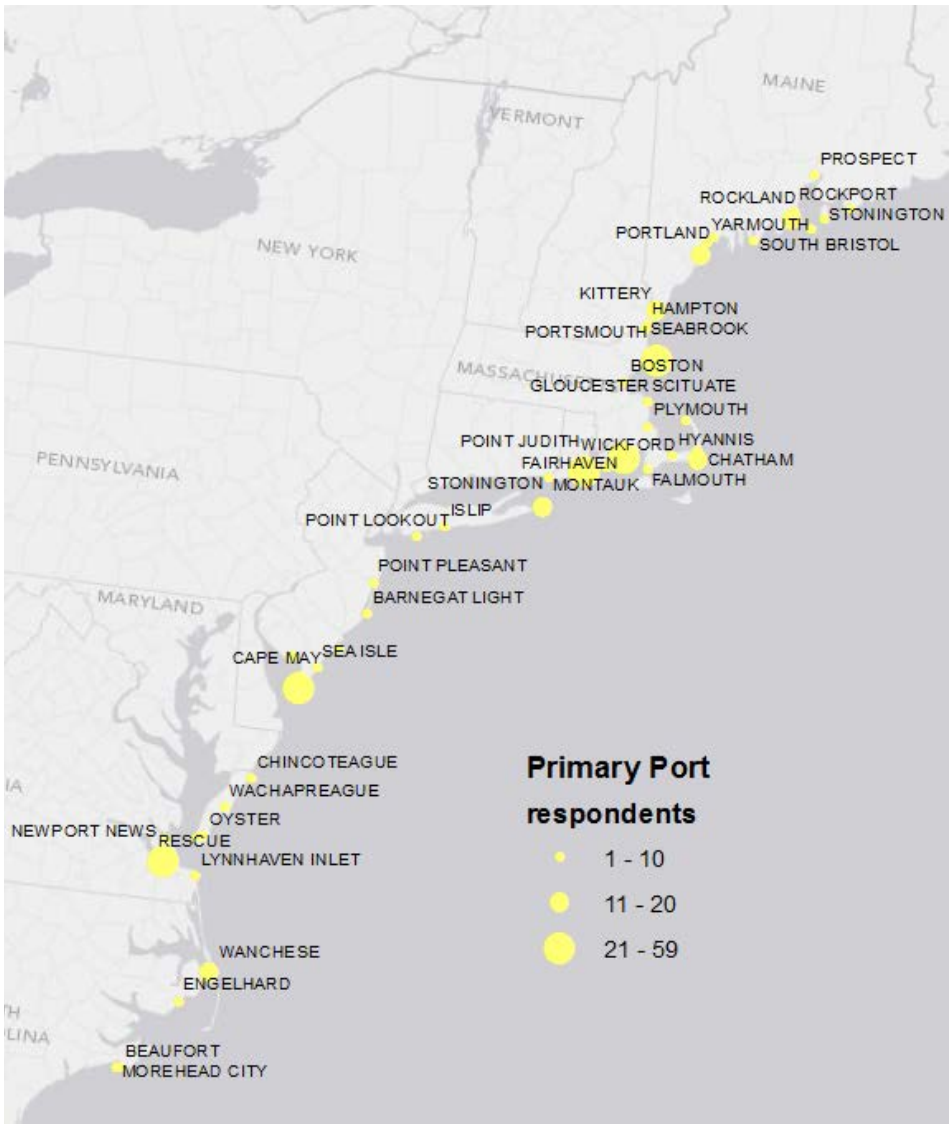

Figure 1. Number of respondents by primary port.

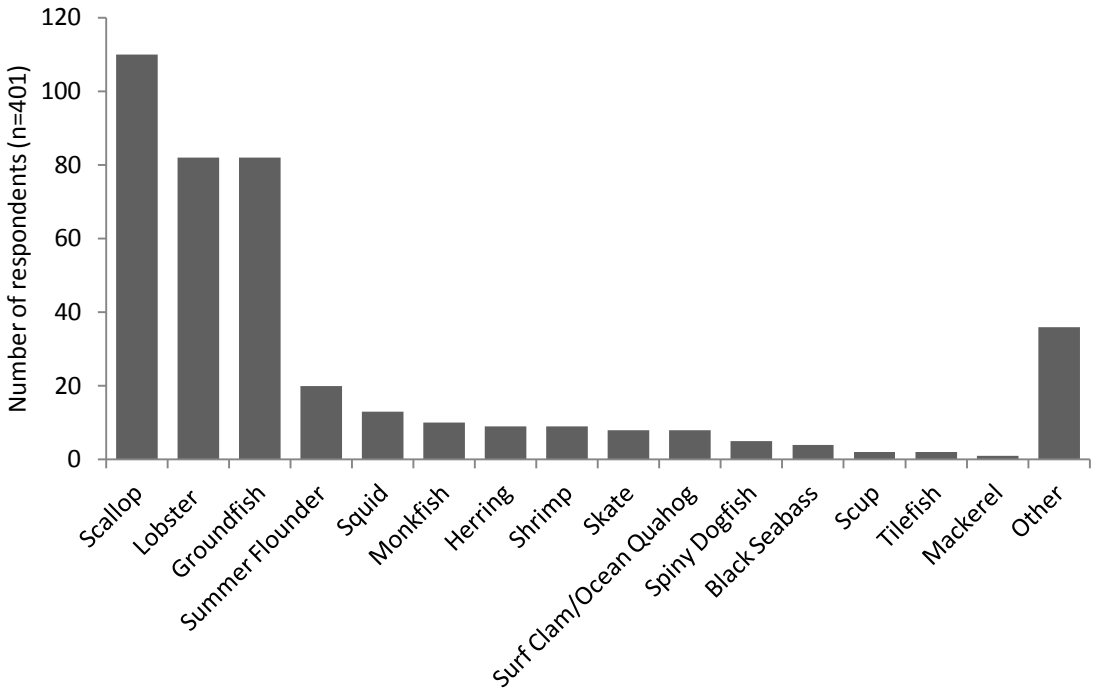

Figure 2. Number of respondents that completed at least a portion of the survey, by primary fishery.

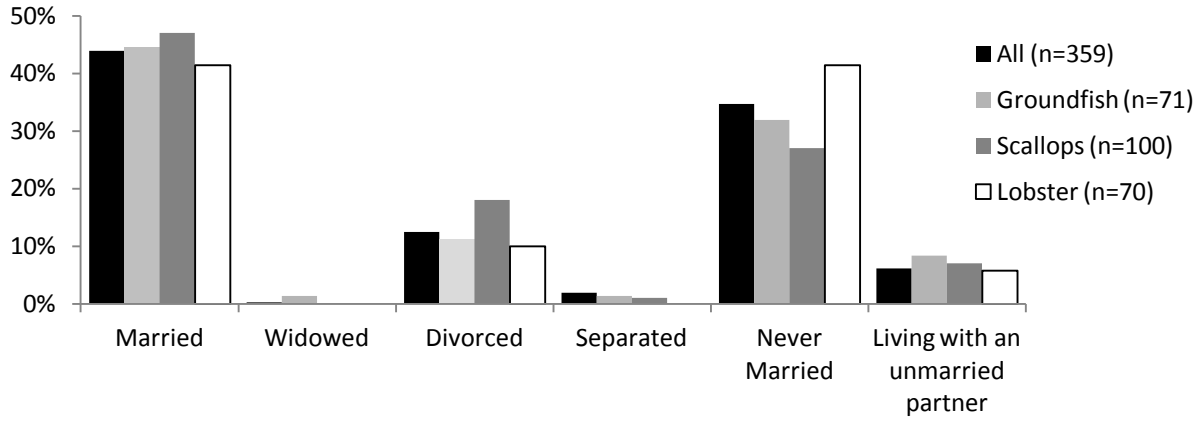

Figure 3. Marital status by primary fishery.

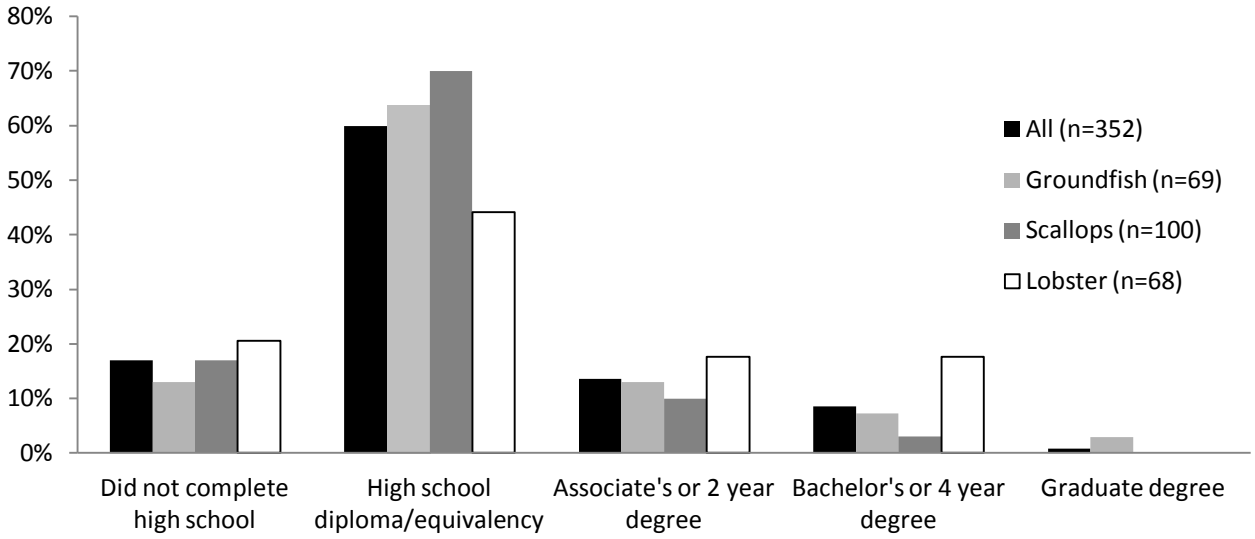

Figure 4. Highest level of education completed by primary fishery.

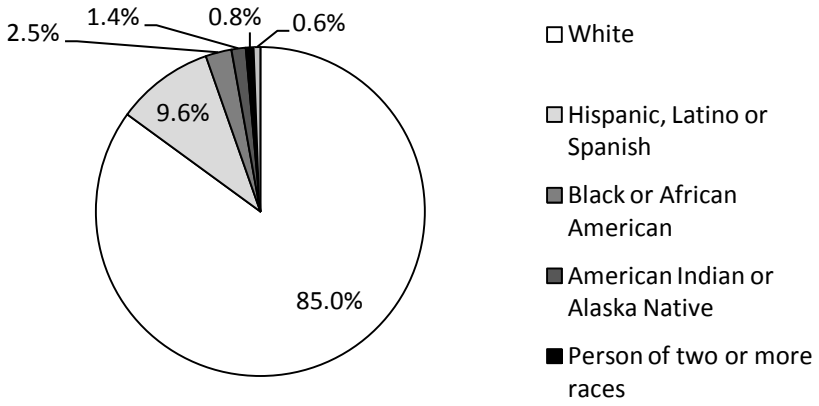

Figure 5. Racial category of respondents.

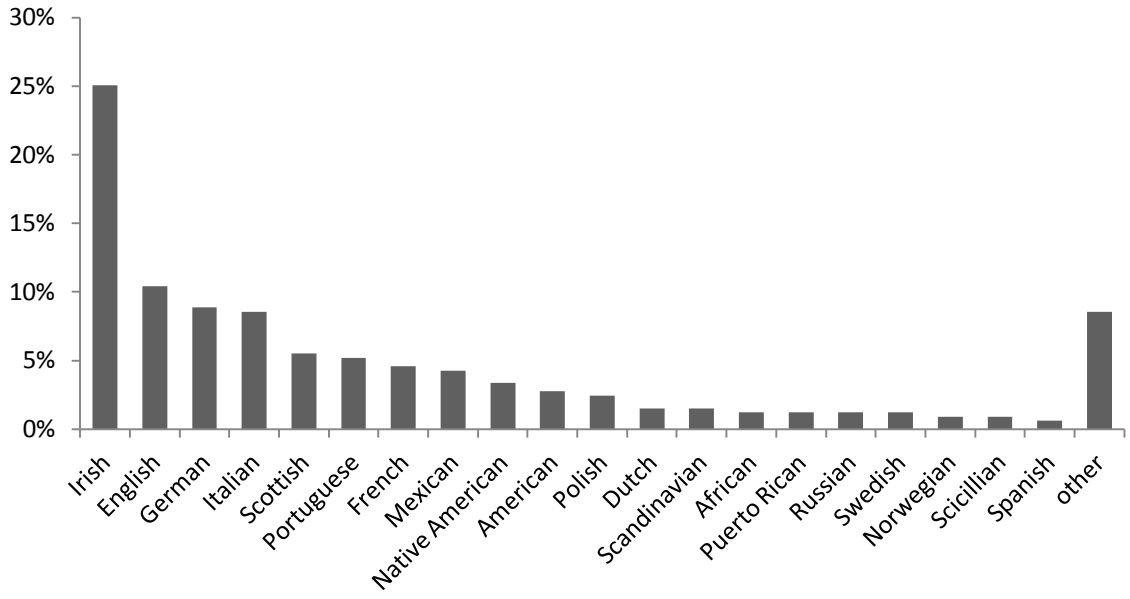

Figure 6. Self-identified ethnicity. Ethnic grouping listed based upon first ethnicity listed but include categories with multiple ethnicities (for example a response of "Irish and German" is listed under "Irish").

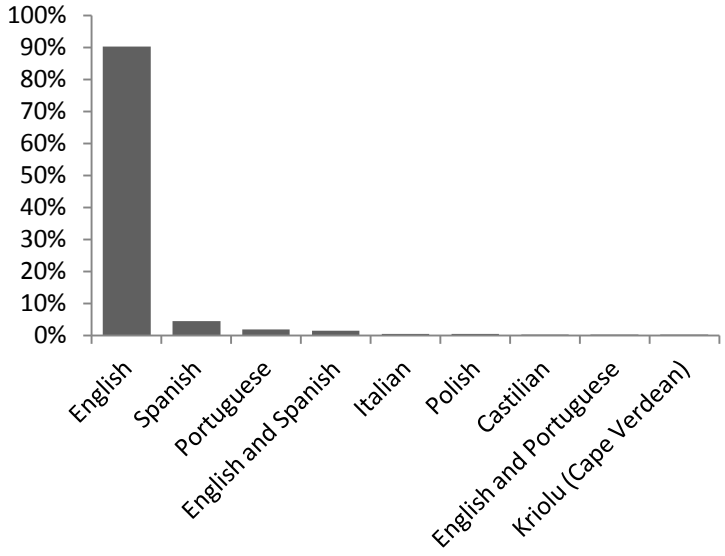

Figure 7. Primary language spoken at home.

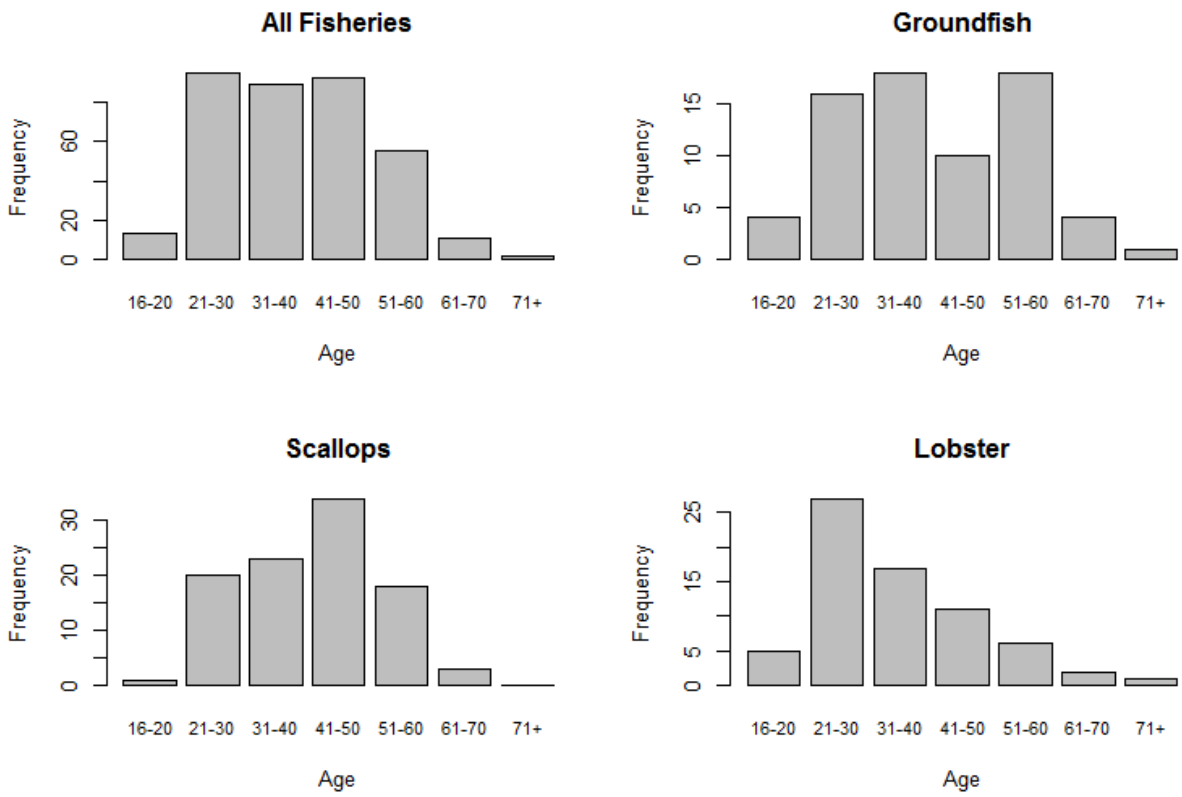

Figure 8. Age distribution by fishery.

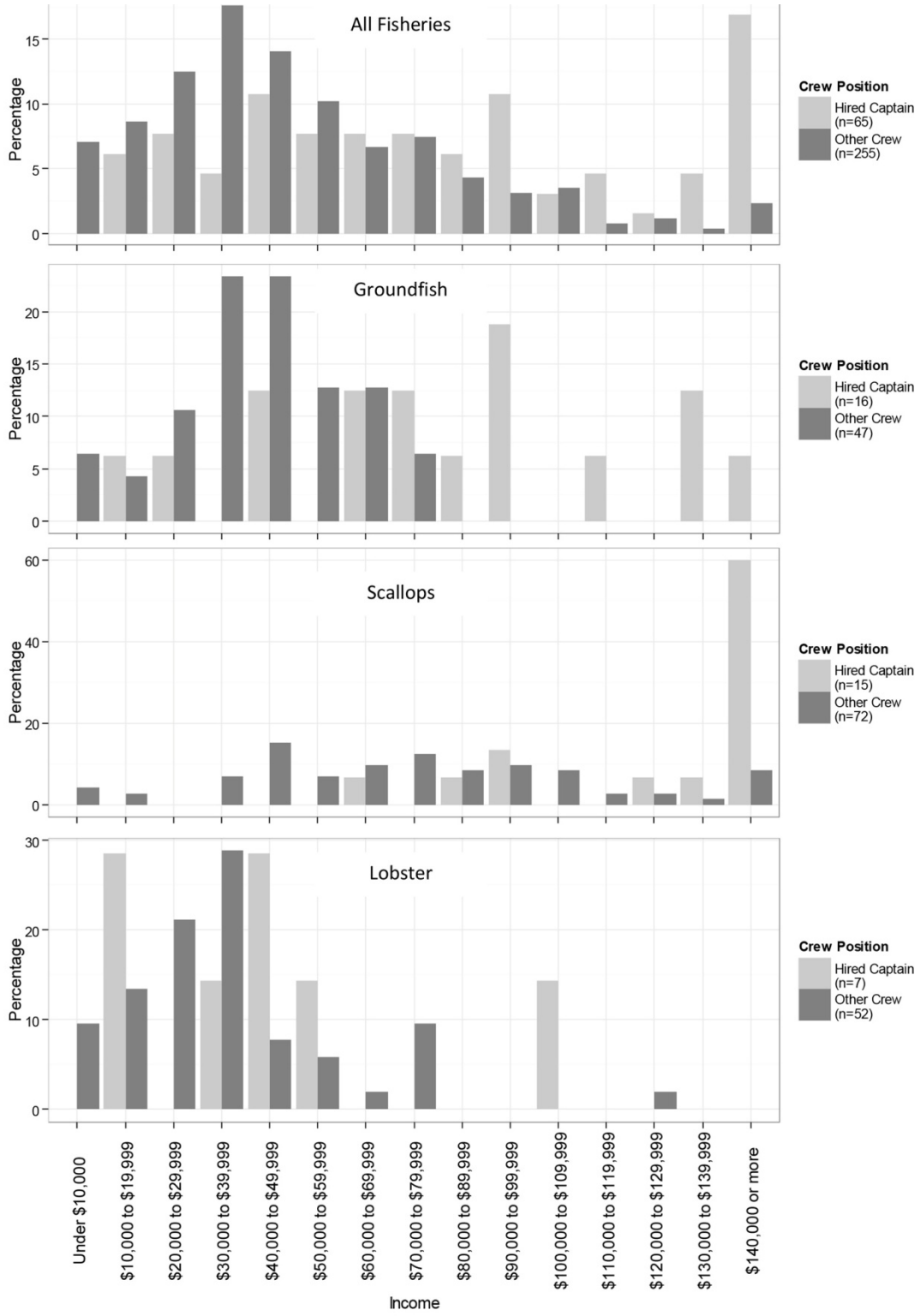

Figure 9. Annual fishing income reported by hired captains and other crew (noncaptains) by fishery.

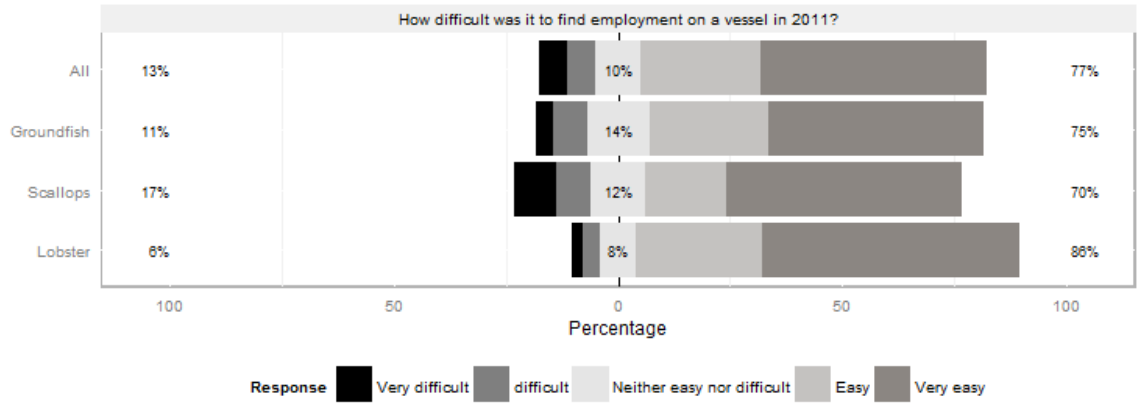

Figure 10. How difficult was it to find employment on a vessel in 2011? (Reported by fishery)

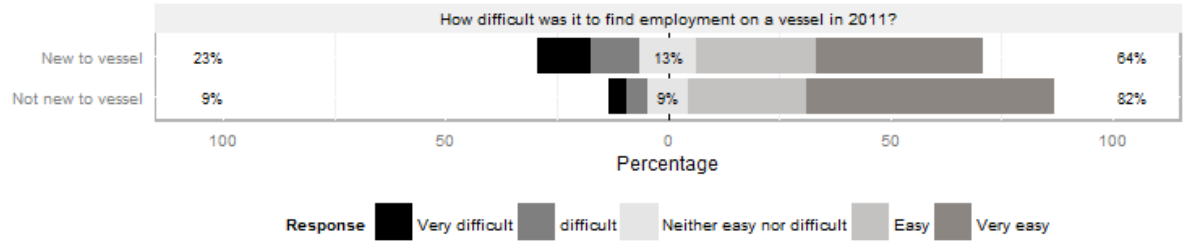

Figure 11. How difficult was it to find employment on a vessel in 2011? (Reported by length of time on vessel)

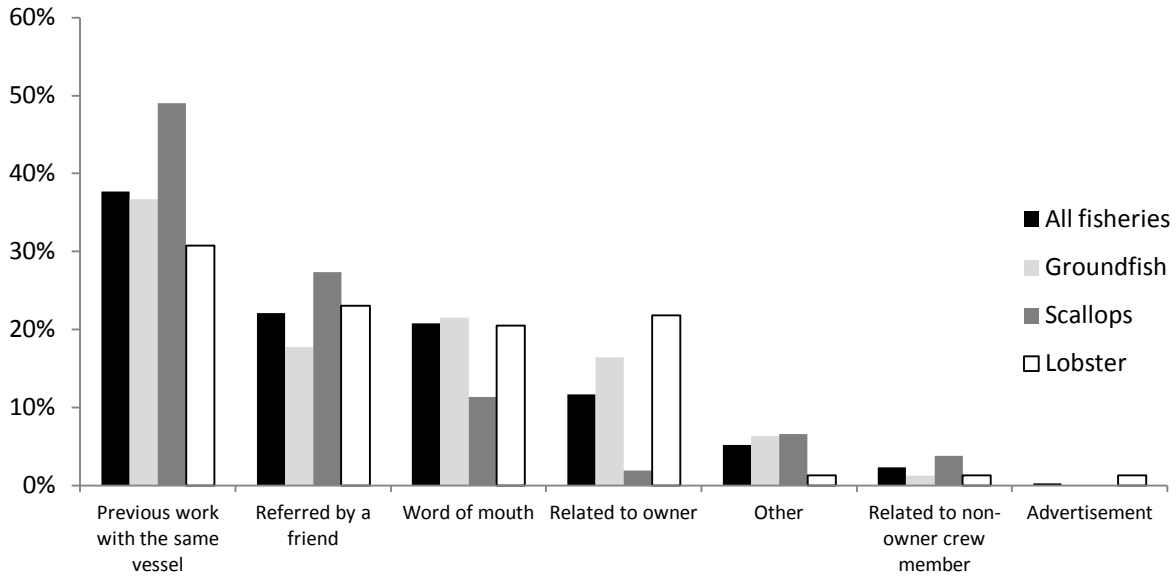

Figure 12. How were you hired for the vessel you worked on in 2011?

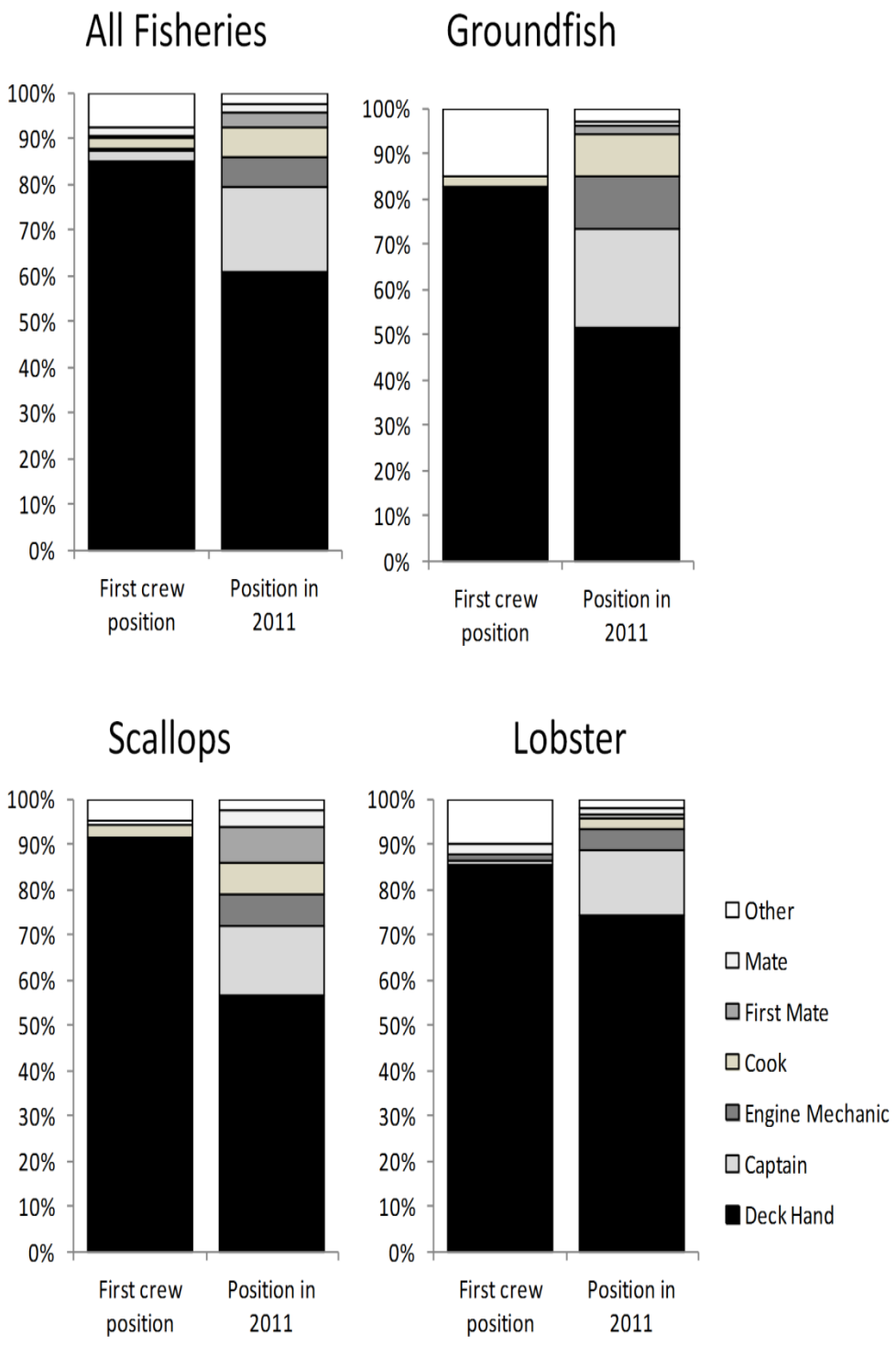

Figure 13. First position on vessel and current position on vessel by fishery.

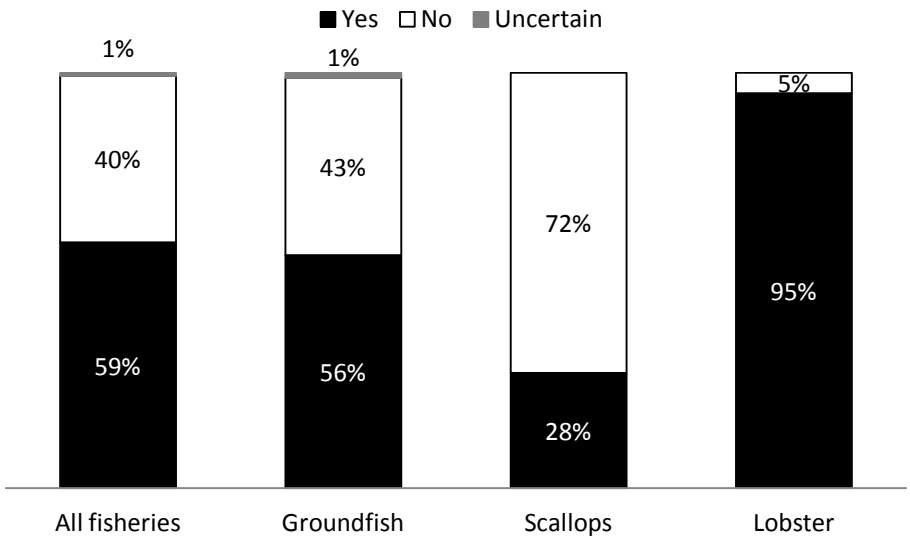

Figure 14. Was your vessel owner operated?

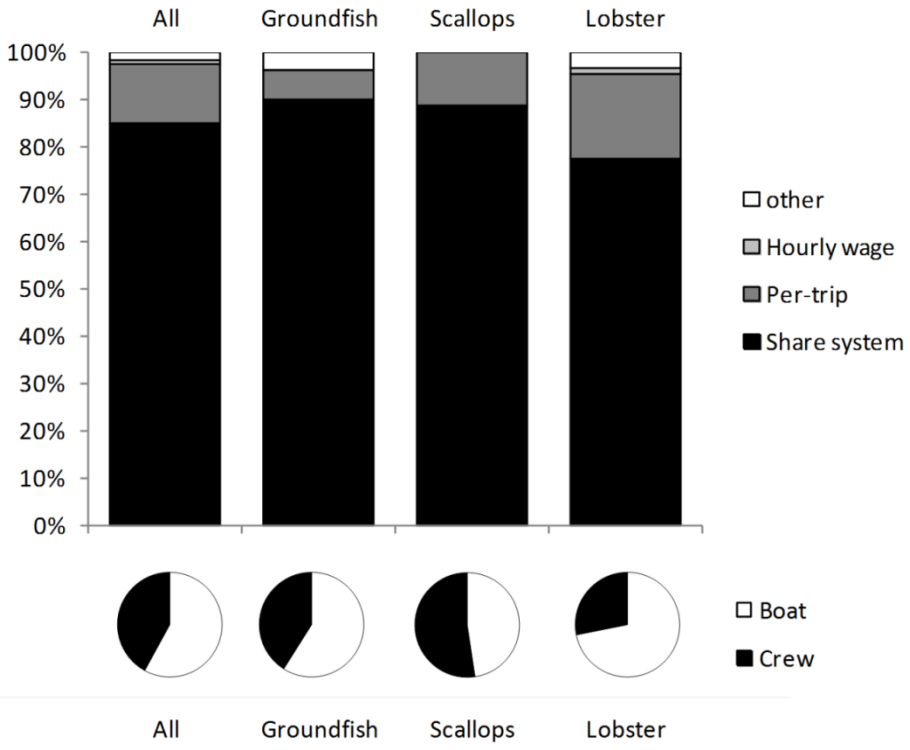

Figure 15 Payment methods by fishery (top). Portion of share to boat and crew for respondents paid through a share system (bottom).

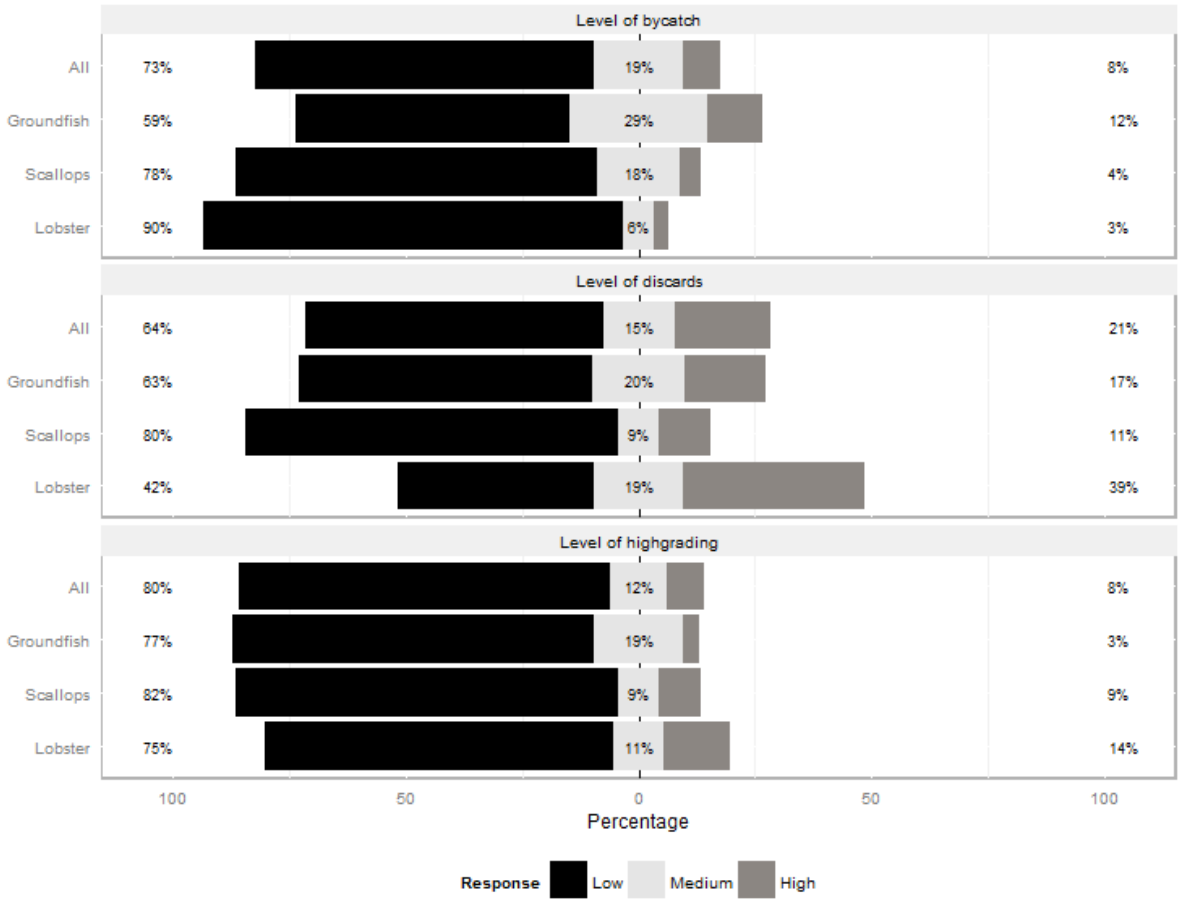

Figure 16. Perceptions of the current levels of bycatch, discards, and highgrading by primary fishery.

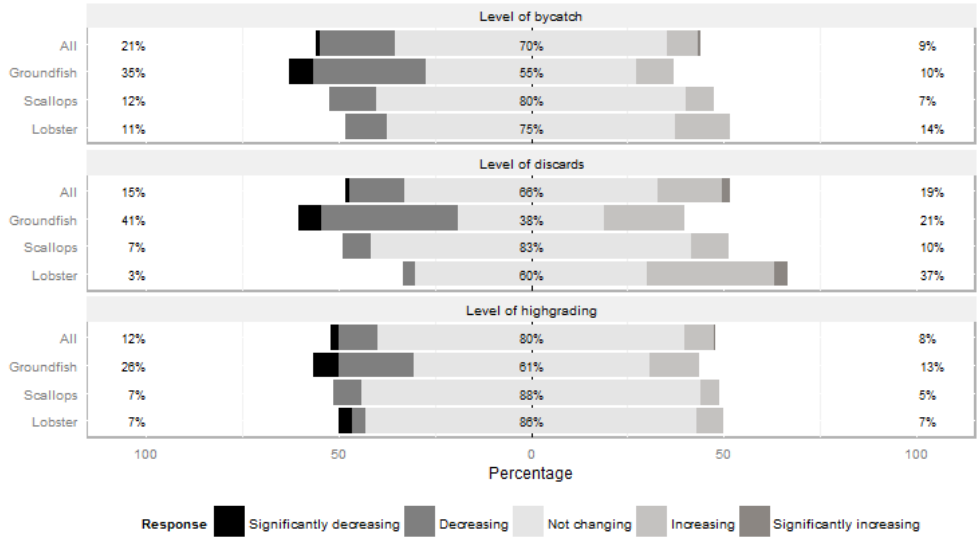

Figure 17. Perceptions of the extent to which bycatch, discards, and highgrading are changing by primary fishery.

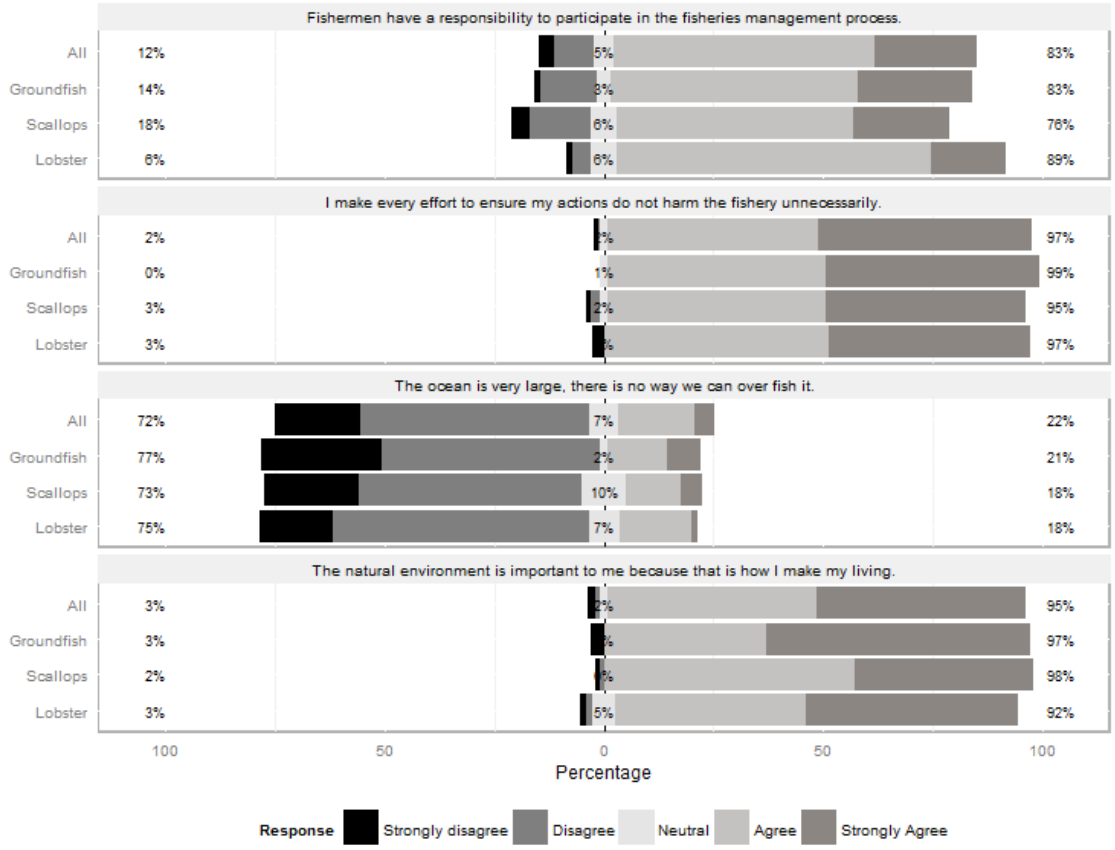

Figure 18. Perceptions of the responsibilities of fishermen regarding fishing and the natural environment by primary fishery.

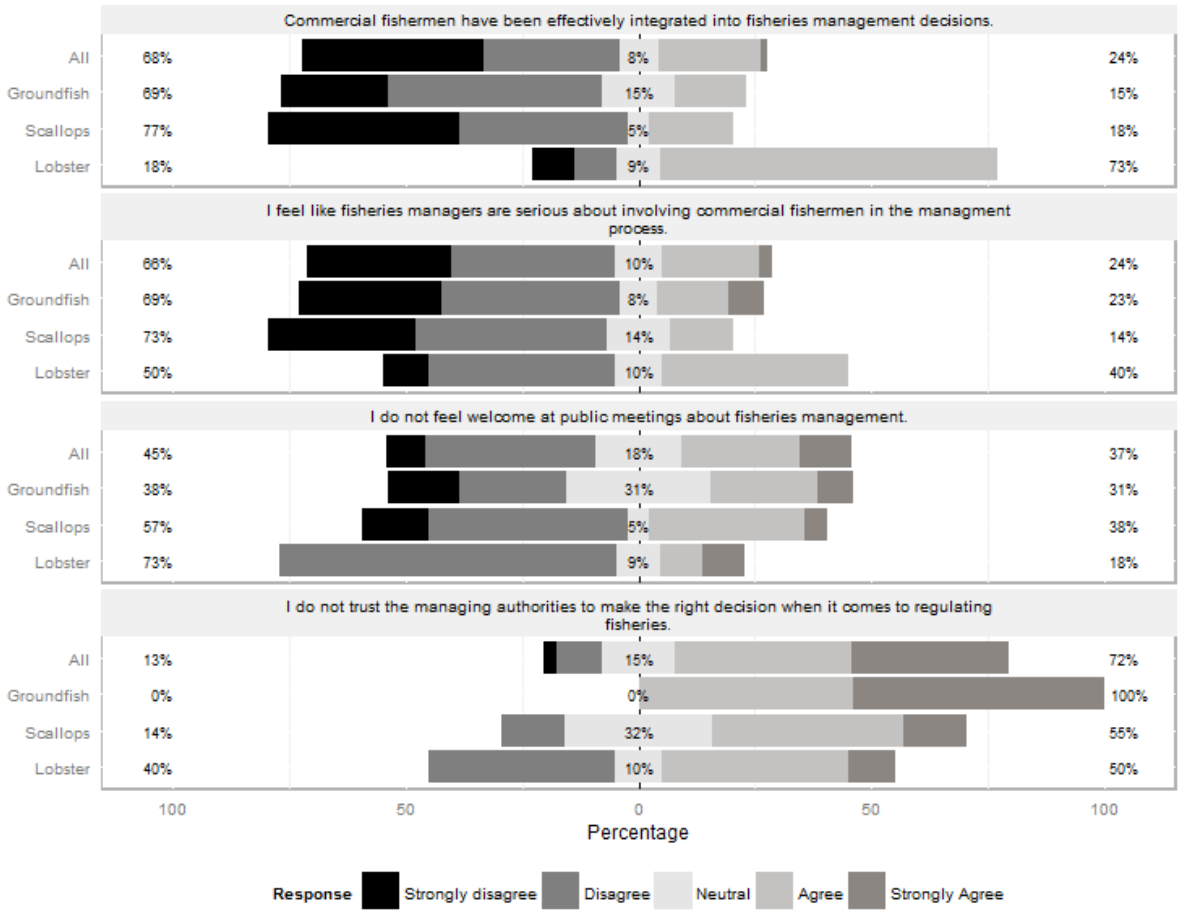

Figure 19. Perception of the most recent federal government-led fisheries management process participated in.

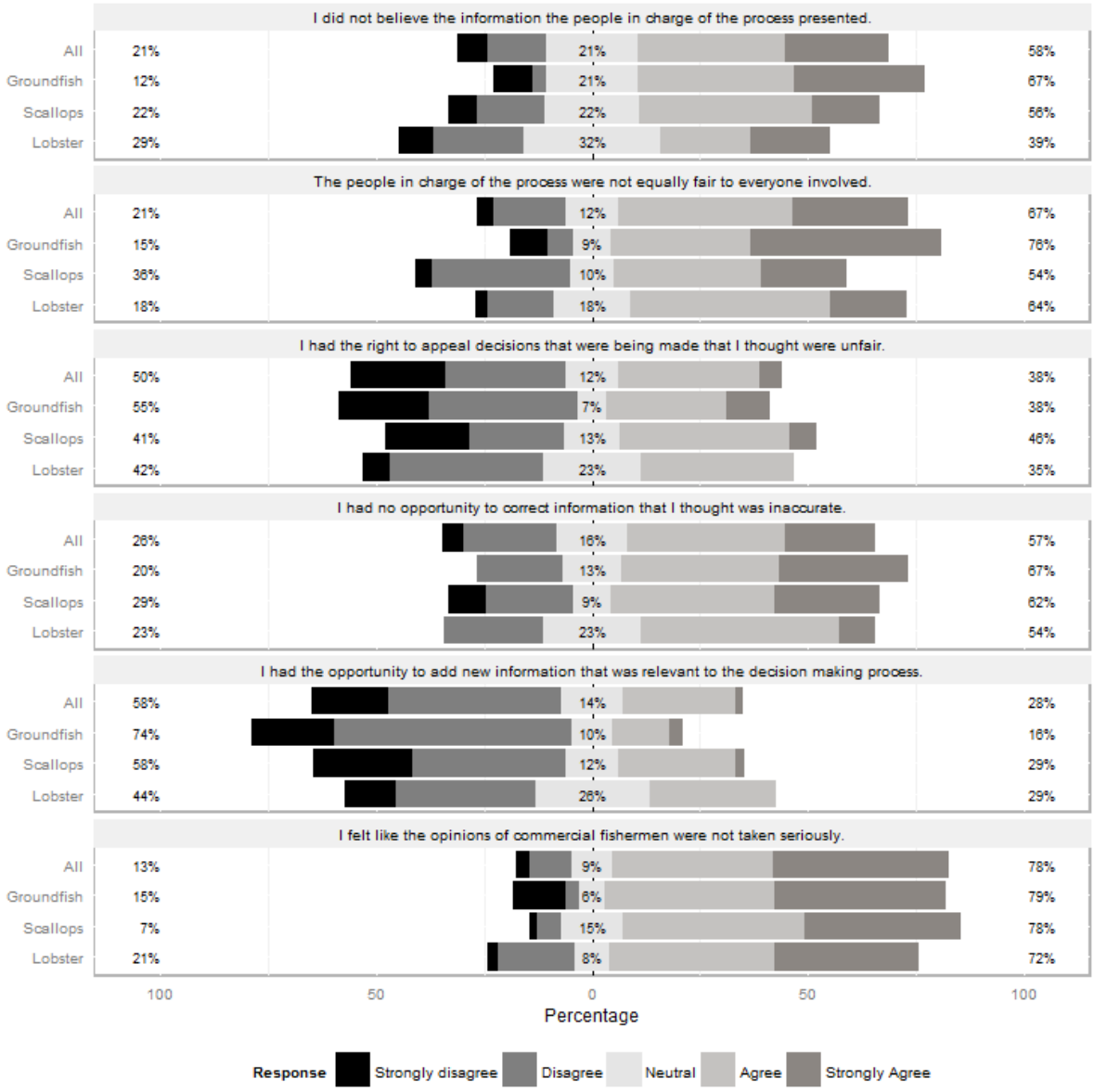

Figure 20. Perception of the federal government's role in creating the regulations that govern your primary fishery.

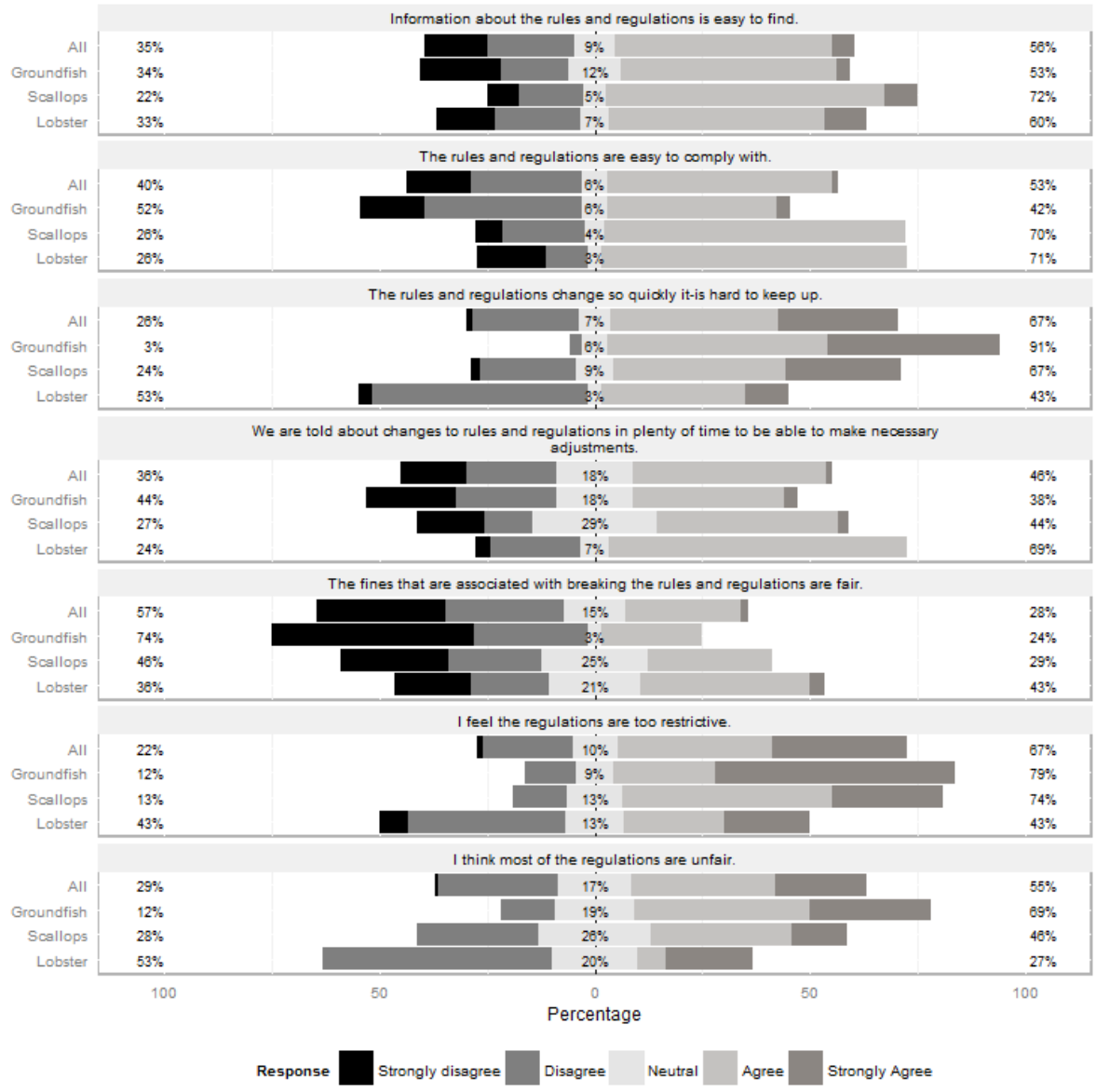

Figure 21. Perceptions of the rules and regulations in your primary fishery.

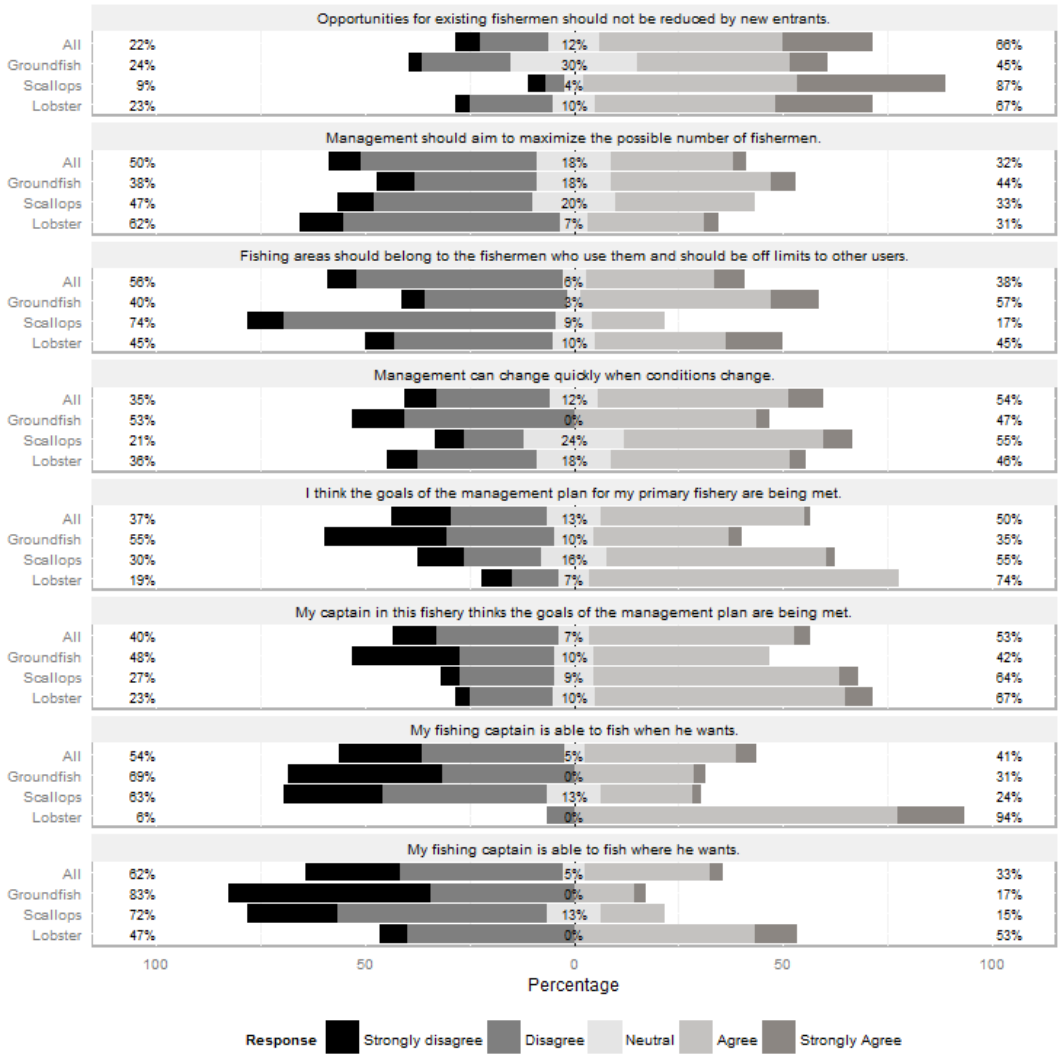

Figure 22. Perceptions of management in your primary fishery.

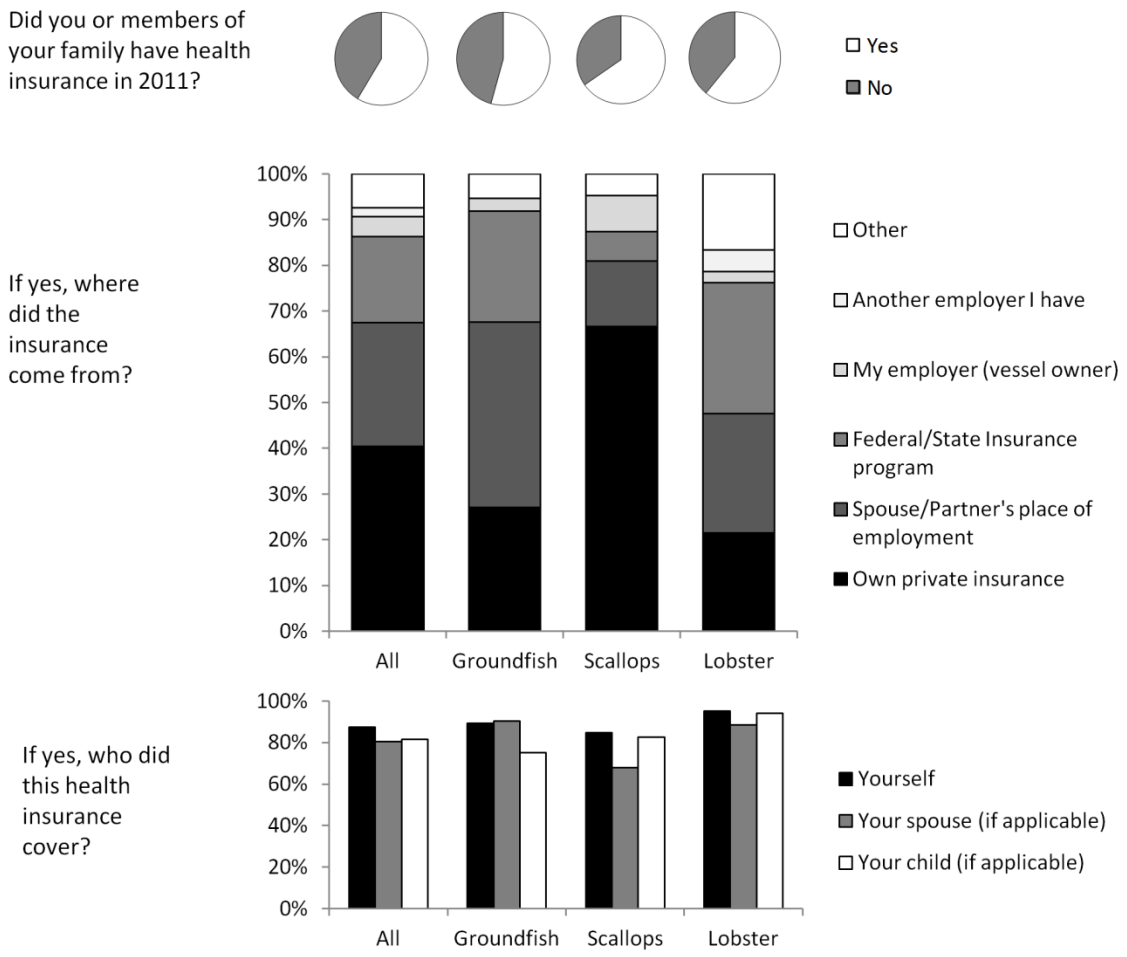

Figure 23. Health insurance access, provider, and coverage information.

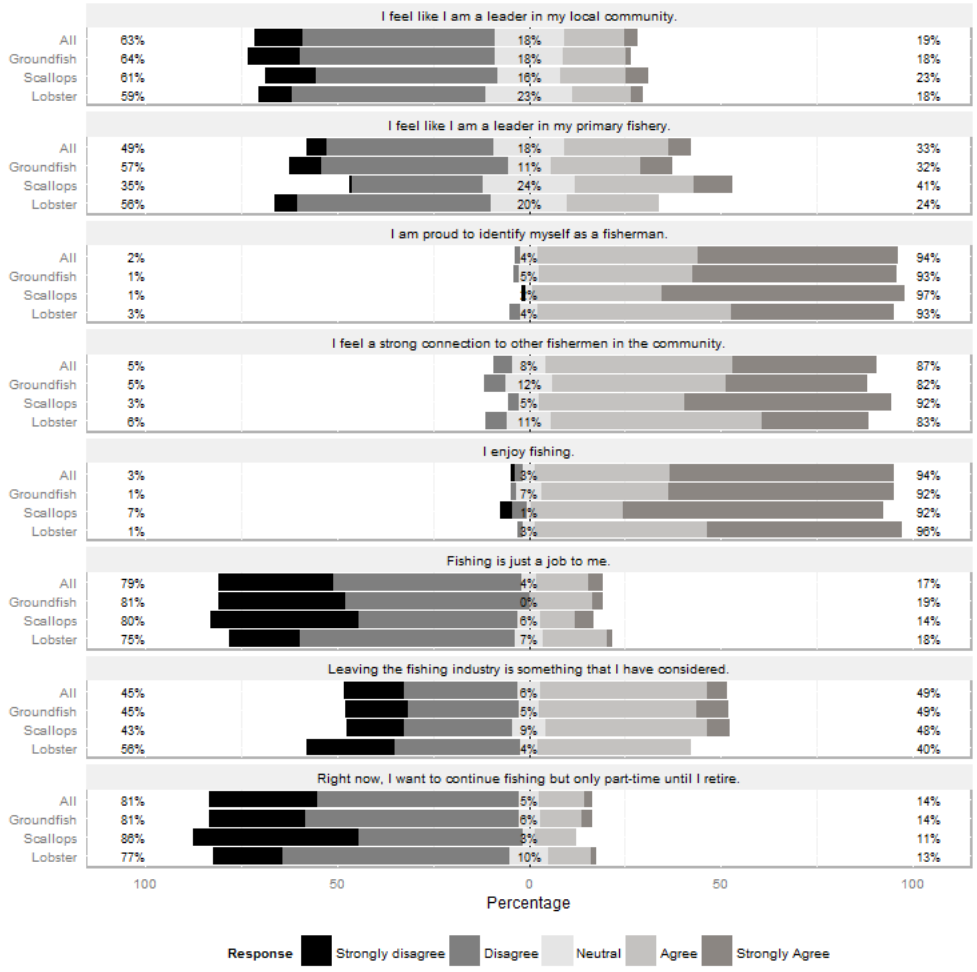

Figure 24. Perceptions of fishing as a career.

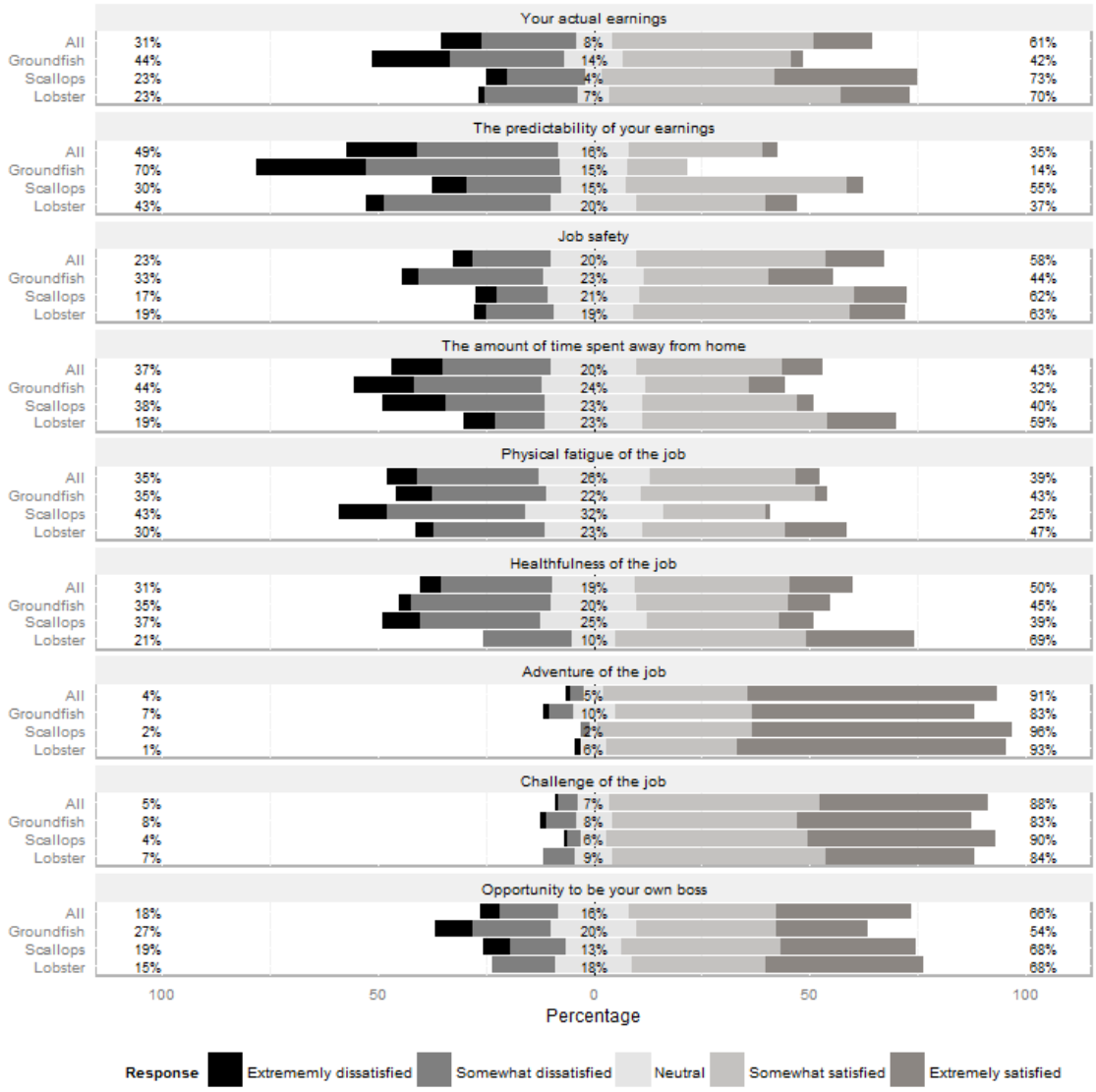

Figure 25. Level of satisfaction with the job of fishing.

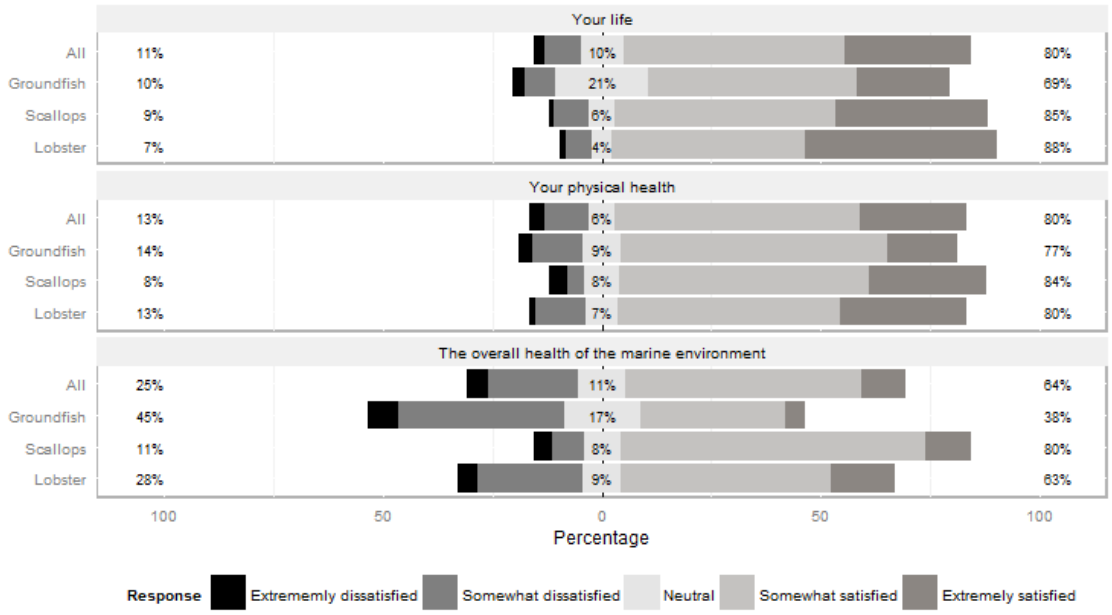

Figure 26. Level of satisfaction with items related to the job of fishing.

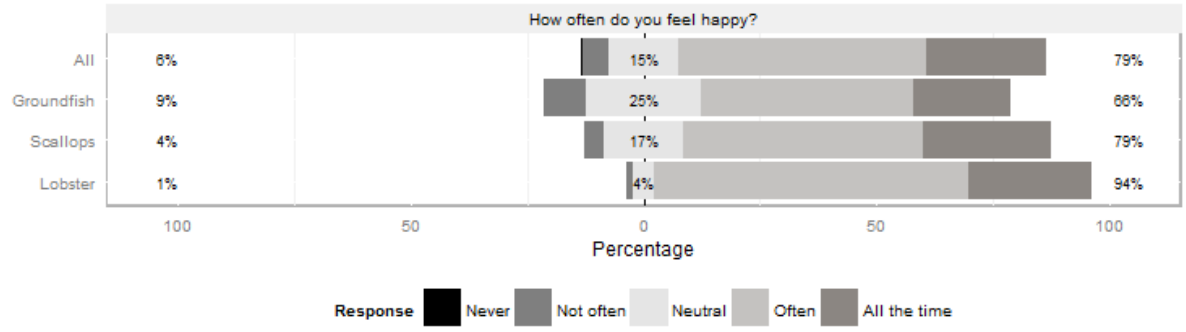

Figure 27. Level of happiness.

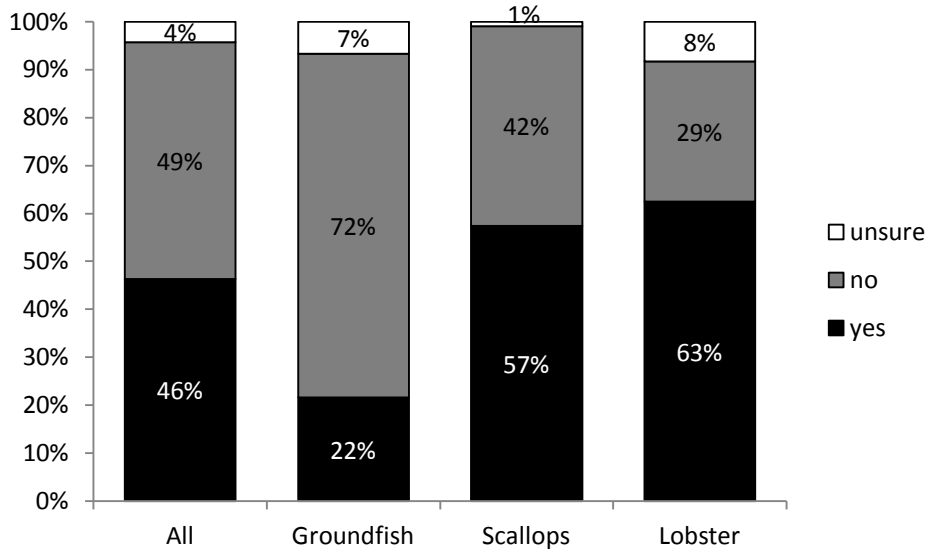

Figure 28. Would you advise a young person to enter fishing?

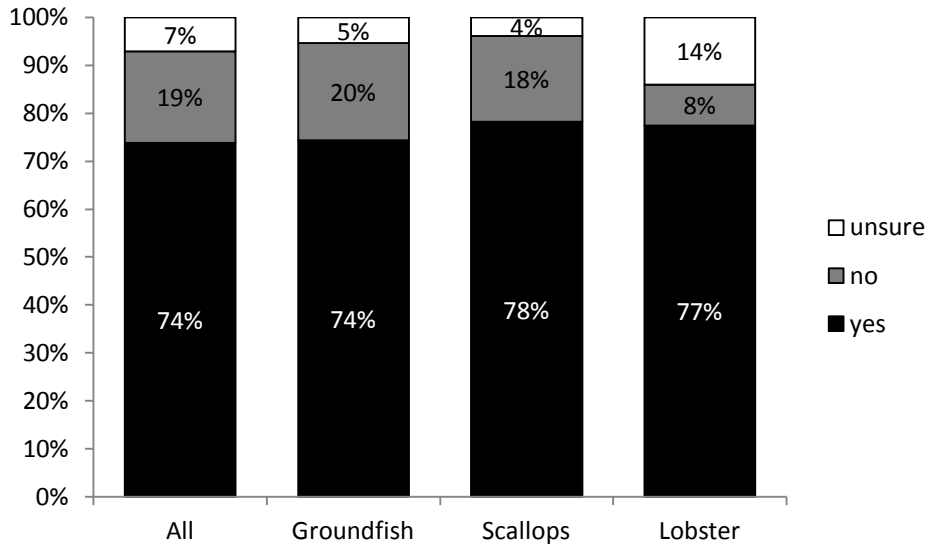

Figure 29. Would you still be a fisherman if you had your life to live over?

Procedures for Issuing Manuscripts in the *Northeast Fisheries Science Center Reference Document* (CRD) Series

Clearance

All manuscripts submitted for issuance as CRDs must have cleared the NEFSC's manuscript/abstract/webpage review process. If any author is not a federal employee, he/she will be required to sign an "NEFSC Release-of-Copyright Form." If your manuscript includes material from another work which has been copyrighted, then you will need to work with the NEFSC's Editorial Office to arrange for permission to use that material by securing release signatures on the "NEFSC Use-of-Copyrighted-Work Permission Form."

For more information, NEFSC authors should see the NEFSC's online publication policy manual, "Manuscript/abstract/webpage preparation, review, and dissemination: NEFSC author's guide to policy, process, and procedure," located in the Publications/Manuscript Review section of the NEFSC intranet page.

Organization

Manuscripts must have an abstract and table of contents, and (if applicable) lists of figures and tables. As much as possible, use traditional scientific manuscript organization for sections: "Introduction," "Study Area" and/or "Experimental Apparatus," "Methods," "Results," "Discussion," "Conclusions," "Acknowledgments," and "Literature/References Cited."

Style

The CRD series is obligated to conform with the style contained in the current edition of the United States Government Printing Office Style Manual. That style manual is silent on many aspects of scientific manuscripts. The CRD series relies more on the CSE Style Manual. Manuscripts should be prepared to conform with these style manuals.

The CRD series uses the American Fisheries Society's guides to names of fishes, mollusks, and decapod crustaceans, the Society for Marine Mammalogy's guide to names of marine mammals, the Biosciences Information Service's guide to serial title abbreviations, and the ISO's (International Standardization Organization) guide to statistical terms.

For in-text citation, use the name-date system. A special effort should be made to ensure that all necessary bibliographic information is included in the list of cited works. Personal communications must include date, full name, and full mailing address of the contact.

Preparation

Once your document has cleared the review process, the Editorial Office will contact you with publication needs – for example, revised text (if necessary) and separate digital figures and tables if they are embedded in the document. Materials may be submitted to the Editorial Office as files on zip disks or CDs, email attachments, or intranet downloads. Text files should be in Microsoft Word, tables may be in Word or Excel, and graphics files may be in a variety of formats (JPG, GIF, Excel, PowerPoint, etc.).

Production and Distribution

The Editorial Office will perform a copy-edit of the document and may request further revisions. The Editorial Office will develop the inside and outside front covers, the inside and outside back covers, and the title and bibliographic control pages of the document.

Once both the PDF (print) and Web versions of the CRD are ready, the Editorial Office will contact you to review both versions and submit corrections or changes before the document is posted online.

A number of organizations and individuals in the Northeast Region will be notified by e-mail of the availability of the document online.

Research Communications Branch
Northeast Fisheries Science Center
National Marine Fisheries Service, NOAA
166 Water St.
Woods Hole, MA 02543-1026

MEDIA MAIL

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:

NOAA Technical Memorandum NMFS-NE -- This series is issued irregularly. The series typically includes: data reports of long-term field or lab studies of important species or habitats; synthesis reports for important species or habitats; annual reports of overall assessment or monitoring programs; manuals describing program-wide surveying or experimental techniques; literature surveys of important species or habitat topics; proceedings and collected papers of scientific meetings; and indexed and/or annotated bibliographies. All issues receive internal scientific review and most issues receive technical and copy editing.

Northeast Fisheries Science Center Reference Document -- This series is issued irregularly. The series typically includes: data reports on field and lab studies; progress reports on experiments, monitoring, and assessments; background papers for, collected abstracts of, and/or summary reports of scientific meetings; and simple bibliographies. Issues receive internal scientific review and most issues receive copy editing.

Resource Survey Report (formerly *Fishermen's Report*) -- This information report is a regularly-issued, quick-turnaround report on the distribution and relative abundance of selected living marine resources as derived from each of the NEFSC's periodic research vessel surveys of the Northeast's continental shelf. This report undergoes internal review, but receives no technical or copy editing.

TO OBTAIN A COPY of a *NOAA Technical Memorandum NMFS-NE* or a *Northeast Fisheries Science Center Reference Document*, either contact the NEFSC Editorial Office (166 Water St., Woods Hole, MA 02543-1026; 508-495-2350) or consult the NEFSC webpage on "Reports and Publications" (http://www.nefsc.noaa.gov/nefsc/publications/). To access *Resource Survey Report*, consult the Ecosystem Surveys Branch webpage (http://www.nefsc.noaa.gov/femad/ecosurvey/mainpage/).

ANY USE OF TRADE OR BRAND NAMES IN ANY NEFSC PUBLICATION OR REPORT DOES NOT IMPLY ENDORSEMENT.