APPENDIX II

Northeast Fisheries Science Center (NEFSC) Crew Survey

LAGC IFQ Program Review, 2016-2023

Crew Survey Component of the LAGC IFQ 5-Year Review

Dr. Robert Murphy, Northeast Fishery Science Center, SSB

Summary

This analysis incorporates data from the NEFSC Social Sciences Branch's *Crew Survey,* which was conducted over three separate waves: 2012/2013, 2018/2019, and 2023/2024. Over these three waves, commercial fishing crew were surveyed on various aspects of their employment including on 1) Commercial fishing vessel crew demographics; 2) Participation and practices; 3) Views on fishery management; 4) Job satisfaction; 5) Well-being over time. The first survey wave enabled analysis of IFQ vessel crew specifically. However, survey length was reduced substantially over time to improve response and completion rates, such that we are unable to compare IFQ vessel crew to those that work on non-IFQ vessels (i.e., LA). Coupled with generally low sample sizes, analyses here are limited to comparisons 1) between Sea Scallop crew and other fishery crews and 2) within Sea Scallop crew over time. Additionally, the majority of respondents indicated that there were on average roughly 7 crew members on vessels in which they fished. This suggests that most participants of the survey may primarily fish on vessels with Limited Access permits (although LA vessels may also hold IFQ permits).

The primary findings from this analysis are listed here and described in detail below:

- Across the three Crew Survey waves, crew income generally peaked in 2018/2019 with more than half of the survey respondents making more than $120,000 per year. The Sea Scallop fishery appears to have lost the oldest crew members between the second and third waves (2018/2019 to 2023/2024).
- Average Sea Scallop crew experience has declined over time, whereas crew on non-Sea Scallop vessels seems more stable across the three survey waves. Similarly, the average number of hours worked per day has remained relatively stable in non-Sea Scallop fisheries but in the latest wave, average hours worked amongst Sea Scallop crew went down ~5 hours per day.
- Both Sea Scallop and non-Sea Scallop crew find it much easier to find employment in commercial fishing in the latest Crew Survey wave.
- Crew perceptions on the fairness of fishing-related fines have been variable over time. In particular, perceptions of fine fairness have declined from the second to the third wave amongst Sea Scallop crew.
- For both Sea Scallop and non-Sea Scallop crew, the sentiment that regulations are too restrictive has grown between the second and third Crew Survey wave.
- The proportion of crew that participate in management has declined over time with only ~25% of Sea Scallop crew participating.
- Crew, on average, are satisfied with their job safety. Similarly, there is generally satisfaction with actual job earnings. However, there seems to be consistency across

time where Sea Scallop crew are more satisfied with the predictability of their earning than non-Sea Scallop crew.
- Sea Scallop crew are generally neutral toward leaving the industry. This has been consistent over time.
- The proportion of revenue distributed to fishing crew has declined over time. The types of expenses that are deducted from crew shares have also changed.

The first IFQ 5-year Review used survey data from the first wave of the Crew Survey only, which did allow for a comparison of crew on IFQ vessels versus non-IFQ vessels. A bulleted list of those initial findings for the period 2012/2013 are pasted here:

- Crew members of IFQ vessels were more likely than those on non-IFQ vessels to report that they did not trust managing authorities to make the right decisions when it came to regulating fisheries.
- Crew members of IFQ vessels were more likely than those on non-IFQ vessels to report that their captains were able to fish where he wanted to.
- Crew members of IFQ vessels were more likely than those on non-IFQ vessels to report that overall levels of bycatch and discards were high in their primary fisheries. IFQ vessel crew members were also more likely than non-IFQ crew to report that regulations had increased levels of bycatch and discards in their primary fishery.
- There were no significant differences between IFQ and non-IFQ crew members on any of the items assessing job satisfaction or overall health and wellbeing. Both groups of crew members generally expressed satisfaction with their earnings, time away from home, and the adventure of the job. Both groups also generally expressed that they felt connected to other fishermen and that they were proud to be fishermen.

Introduction

This report is meant to provide insights into the socio-demographic characteristics and perspectives of fishing crew in the Atlantic Sea Scallop fishery. Specifically, survey-based data from Sea Scallop crew are analyzed over time and are compared to crew on non-Sea Scallop vessels. Given that the goal of this review is broadly to assess the IFQ program's effects on the net benefits to the Nation, this analysis and report contributes context from the perspective of Sea Scallop crew.

Specifically, data for this analysis is derived from the *Survey on the Socio-Economic Aspects of Commercial Fishing Crew in New England and Mid-Atlantic* (i.e., Crew Survey) conducted by the Social Sciences Branch (SSB) of the National Oceanic and Atmospheric Administration (NOAA) Fisheries Northeast Fisheries Science Center (NEFSC). While we are unable to compare IFQ fishermen to non-IFQ fishermen, this analysis highlights potential vulnerabilities of Sea Scallop crew, including theoretical vulnerabilities based on socio-demographic attributes and crew perceptions of their employment. The enactment of the IFQ management system is just one of many system changes that Sea Scallop fishermen have had to navigate (Gibbs et al.

in review), such that an understanding of fishing crew vulnerabilities in general will better equip managers to predict the possible outcomes of future system states.

Methods

The NEFSC Crew Survey has used an intercept-style survey across three distinct collection waves: 2012/2013, 2018/2019, and 2023/2024. Over these three waves, commercial fishing crew were queried on various aspects of their employment. While some questions and sections were eliminated in subsequent years to reduce response burden, each survey wave captured information on the following topics: 1) Commercial fishing vessel crew demographics; 2) Participation and practices; 3) Views on fishery management; 4) Job satisfaction; 5) Well-being over time.

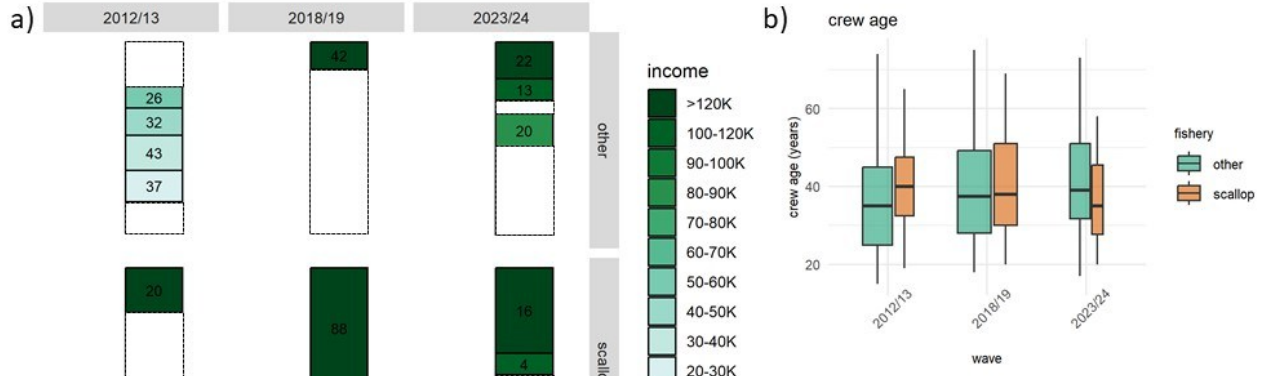
Detailed information on the methods used to execute the Crew Survey can be found in the NOAA Technical Memorandum NMFS-NE-274 (Silva et al. 2021) and published work by Cutler et al. (2022).

Social Scientists from the NEFSC intercepted commercial fishing crew at various ports throughout the Northeast's Greater Atlantic region (North Carolina to Maine), where they administered voluntary and confidential surveys that took roughly 10 minutes to complete in the most recent wave. The survey was not limited to federal vessels and all crew members could participate, including hired captains. Port sampling schemes (i.e., location and timing prioritization) were most recently determined based on vessel trip reports and federally permitted dealer reports. For the first survey wave, a geographically stratified random sampling approach was utilized. Inefficiencies resulting from this approach resulted in the use of a probability proportional to size (PPS) sampling method for the second and third wave. Specifically, this sampling scheme prioritized the most active ports, identified via a *commercial fishing engagement index* from NOAA's Community Social Vulnerability Indicators (Jepson and Colburn 2013). Given that there is no federal registry for commercial fishing crew, target sample sizes were determined based on estimates of the total population of individuals employed in commercial fishing in New England and the Mid-Atlantic. For example, a target sample size of 377 was determined to be representatively sufficient during wave 2. Across the three waves, the total numbers of responses were 359, 478, 162, respectively, such that responses are generally representative of commercial fishing crew in New England and Mid-Atlantic regions for the first two waves. The most recent survey wave underachieved somewhat on the overall target sample size and the results, therefore, may be less reliable when broken down into sub-sample aggregations such as primary fishery. However, a strength of the new (2nd and 3rd wave) sampling strategy is that researchers focused on intercepting crew at ports where commercial fishing was more active and, therefore, fisheries such as Sea Scallop tend to be well represented in the data.

Results and Discussion

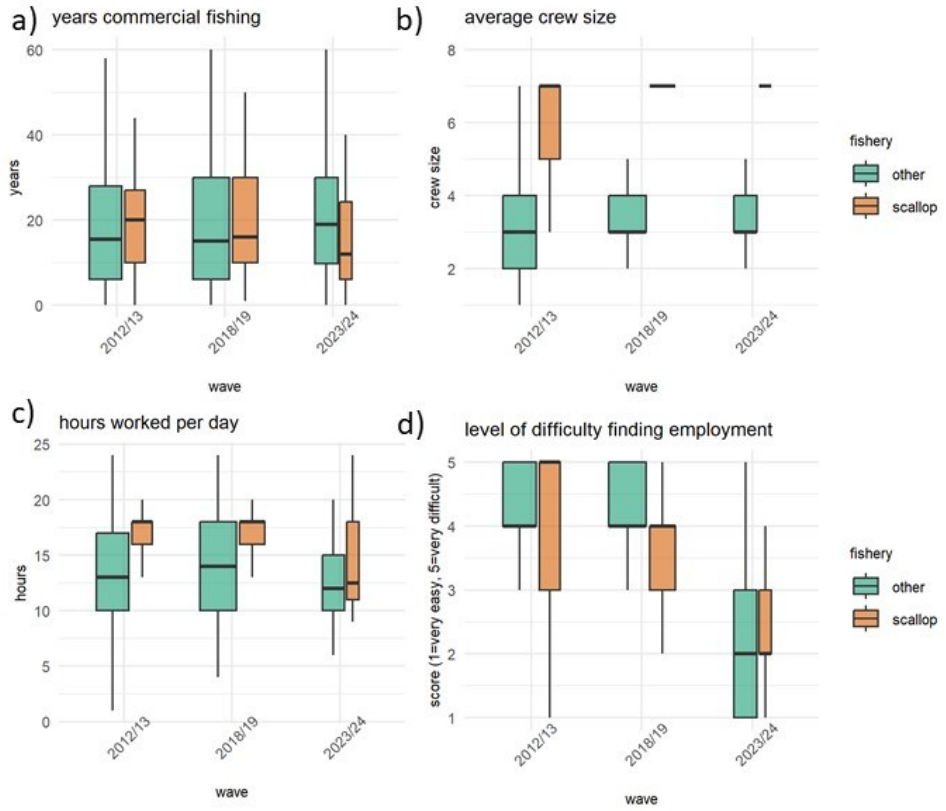
Results from the Crew Survey suggest that important socio-demographics characteristics of the Sea Scallop fishery may have changed over time. Sea Scallop crew have also been able to achieve higher salaries than other fisheries, although there is a clear decline in top end salaries from Wave 2 to 3; 62% of Wave 2 survey respondents made over $120,000, while this dropped to 44% in Wave 3 (Figure 1a). The Sea Scallop fishery also appears to have lost the oldest crew members between the 2018/19 and 2023/24 such that the average age of Sea Scallop crew is 4 years less than other fisheries (Figure 1b). Collectively, this suggests that the composition of Sea Scallop crew and incomes have changed over time, likely impacting the capacity of crew to sufficiently respond to change. It is possible that this cohort of younger crew with lower incomes may be more likely to leave the fishery if conditions decline.

Figure 1. *A summary of socio-demographic information over the three Crew Survey waves demonstrating important differences between scallop crew and non-scallop crew and/or within scallop crew over time. a) crew income by categories, where darker colors indicate higher incomes. Numbers in each bar represent the number of respondents. To protect participant confidentiality, categories of income are shown only when they represent over 10% of the total for each plot; b) Crew age data summarized via box plots (center black line = median age).*



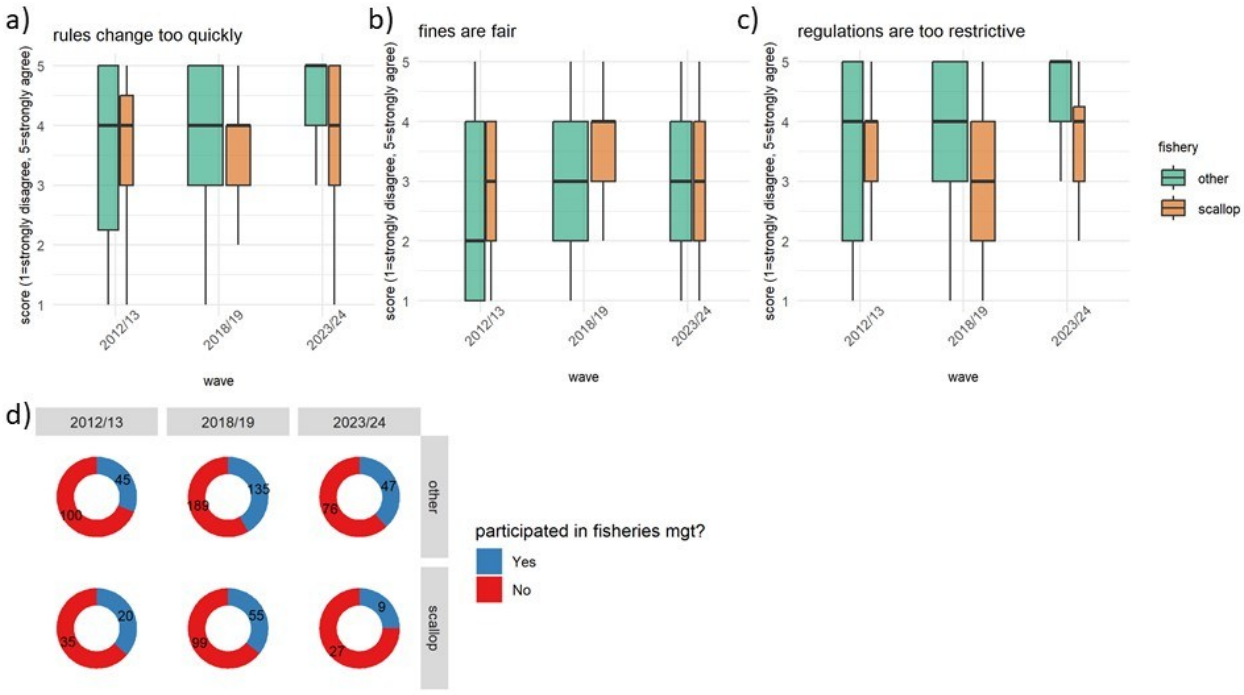
In line with the declines in crew age, the average experience of Sea Scallop crew has declined over time, with a notable drop from 2018/19 to 2023/24; the median number of years experience in commercial fishing for Sea Scallop decreased from 16 to 12 years (Figure 2a). The on-the-water experiences of crew seem to have also changed over time, with both Sea Scallop and non-Sea Scallop crew working far fewer hours per day in the most recent Crew Survey wave. Specifically, the median number of hours worked by Sea Scallop crew declined by over 5 hours from 2018/19 to 2023/24 (Figure 2c). There is also a clear trend in which crew members across fisheries believe that it is much easier to find employment most recently (Figure 2d). Younger, less experienced crew coupled with shorter work days highlight that the fishery has changed over time. The impact of these changes is uncertain however.

Figure 2. *A summary of fishing attribute information over the three Crew Survey waves demonstrating important differences between scallop crew and non-scallop crew and/or within scallop crew over time. For all plots, summarized data is shown via box plots (center black line = median); a) number of years of commercial fishing; b) average crew size on primary vessel; c) number of hours work per day on average on primary vessel; d) level of difficulty in finding employment (answers ranged from 1= very easy to 5 = very difficult).*



The perception that rules change too quickly has been relatively consistent across time, although in the most recent Crew Survey wave only, non-Sea Scallop crew tend to have more negative opinions of the speed at which fishery rules change (Figure 3a). There appears to be general agreement between Sea Scallop and non-Sea Scallop crew on the fairness of fishing-related fines for the most recent Crew Survey. These groups disagreed previously (Figure 3b). Perceptions of fine fairness become less positive from the second to the third Wave amongst Sea Scallop crew. Crew members across fisheries and across time tend to believe that regulations are too restrictive, although this sentiment has grown between the second and third Crew Survey wave (Figure 3c). The proportion of crew that participate in management has declined over time with only ~25% of Sea Scallop crew participating. Collectively, these findings suggest that the Sea Scallop fishery in particular is increasingly feeling pressure from regulatory actions, potentially decreasing their adaptive capacity to future system states. The decreasing propensity for crew to participate in management also highlights that public comments and overall feedback from the fishing industry may have become less representative over time.

Figure 3. *A summary of questions related to fisheries management over the three Crew Survey waves demonstrating important differences between scallop crew and non-scallop crew and/or within scallop crew over time. For the first three plots, summarized data is shown via box plots (center black line = median) and answers ranged from 1= strongly disagree to 5 = strongly agree; a) crew perceptions of whether fishery rules change too quickly; b) crew perceptions of whether fines are fair; c) crew perceptions of whether fishery regulations are too restrictive; d) circular bar plot showing the proportion of crew that have participated in fisheries management processes (numbers in bars represent sample sizes).*

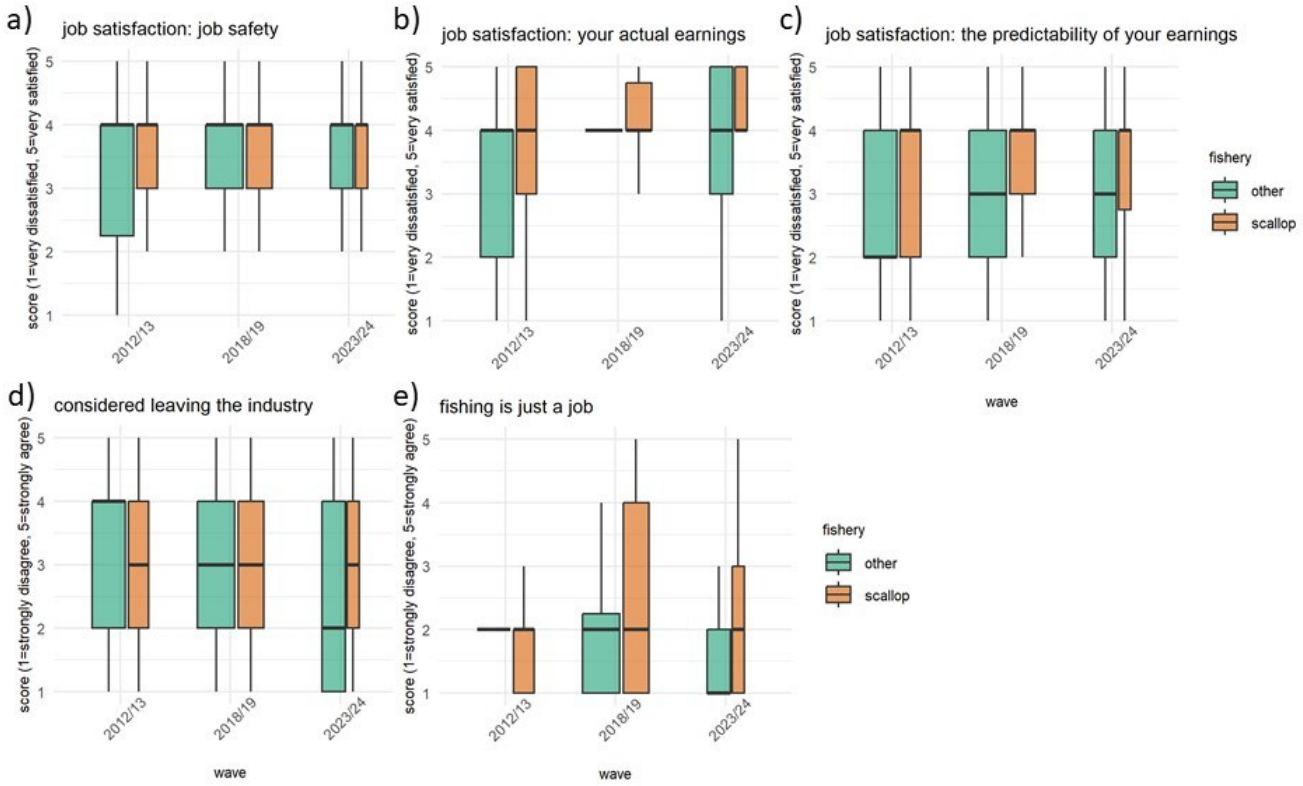


Commercial fishing crew across fisheries are satisfied with their job safety on average. The median of this perception has been consistent over time, although there is considerable variability in crew perceptions (Figure 4a; *also as indicated by raw data not shown in the report due to confidentiality constraints*). Similarly, Sea Scallop crew are mostly satisfied with their actual earnings and the predictability of their earnings (Figure 4b, 4c). There seems to be consistency across time where Sea Scallop crew have more positive median perceptions of earnings predictability compared to non-Sea Scallop crew. The median response to whether Sea Scallop crew would consider leaving the fishing industry has been consistently neutral over time (Figure 4d). The majority of commercial fishing crew across fisheries and survey periods believe that fishing is more than a job, highlighting the cultural significance of commercial fishing operations (Figure 4e).

While we cannot deduce differences between IFQ and non-IFQ Sea Scallop crew, we do not find evidence of large declines in crew perceptions (i.e., more negative viewpoints) of careers in

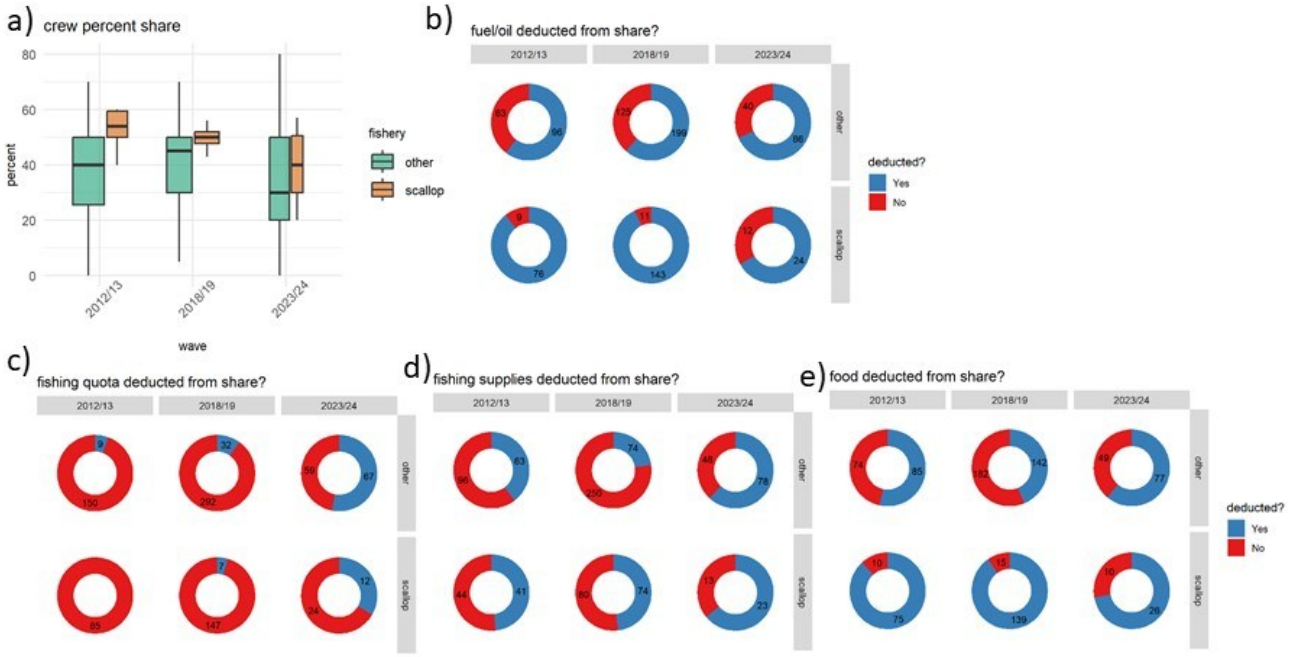
fishing over the time since the IFQ program has been implemented. However, we do not have data pre-IFQ program, precluding a Before-vs-After analysis.

Figure 4. *A summary of crew perceptions of their job satisfaction and general experiences as assessed from the three Crew Survey waves demonstrating important differences between scallop crew and non-scallop crew and/or within scallop crew over time. For all plots, summarized data is shown via box plots (center black line = median). For the first three plots, answers ranged from 1= very dissatisfied to 5 = very satisfied and for the last two plots, answers ranged from 1= strongly disagree to 5 = strongly agree. a) crew satisfaction of job safety; b) crew satisfaction of their actual earnings; c) crew satisfaction of the predictability of their earnings; d) crew perceptions of leaving the industry; e) crew perceptions of whether fishing is just a job.*



For crew that are employed under a share system, survey responses suggest that the proportion of revenue distributed to fishing crew has declined over time (Figure 5a). In the Sea Scallop fishery, the median proportion of shares distributed to crew was 54%, 50%, and 40%, across the three survey waves, respectively (Figure 5a). Furthermore, the types of expenses that are deducted from crew shares have also changed. While fuel/oil and food is deducted less frequently in the Sea Scallop fishery in 2023/24, both fishing supplies and fishing quota are more frequently deducted most recently (Figure 5b-e). Coupled with declines in salary over time (Figure 1b), these results suggest that Sea Scallop crew are more vulnerable to changes that would reduce vessel revenue.

Figure 5. *A summary of questions related to share systems used on vessels over the three Crew Survey waves demonstrating important differences between scallop crew and non-scallop crew and/or within scallop crew over time. For the first plot, summarized data is shown via box plots (center black line = median). a) the percentage of revenue distributed to crew (as opposed to the boat). Plots b through e are circular bar plots illustrating the proportion of items that are versus are not deducted from crew shares (numbers in bars represent sample sizes); b) the proportion of crew that indicated fuel and oil were deducted from their payment share; c) the proportion of crew that indicated fishing quotas were deducted from their payment share; d) the proportion of crew that indicated fishing supplies were deducted from their payment share; e) the proportion of crew that indicated food was deducted from their payment share.*



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