



Northeast Fisheries Science Center Technical Memorandum 340

Greater Atlantic Region Commercial Fishing Business Cost Survey for 2022: Survey Implementation, Data Processing Methods and Results

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I. EXECUTIVE SUMMARY

This report summarizes the Greater Atlantic Region Business Cost Survey for 2022 survey effort, administered by the Social Sciences Branch of the Northeast Fisheries Science Center. An overview of the cost survey effort is provided followed by detailed descriptions of the quality assurance and quality control (QA/QC) measures implemented to process the data as well as survey response rates, representativeness assessment results, question summaries, and non-response postcard results.

II. 2022 SURVEY BACKGROUND

A. Overview

The Greater Atlantic Region Business Cost Survey is a voluntary survey collecting comprehensive cost information from federally permitted commercial fishing vessels in the region. The last implementation of this survey occurred during 2023, collecting costs incurred in 2022 (hereafter referred to as the 2022 Cost Survey), (Appendix Figure 1-6). The information collected within the survey includes vessel repairs, maintenance/upgrades and improvement costs, trip expenses, crew payments and systems, overhead costs, and quota costs/revenues. The primary goal of the survey is to collect the necessary cost data to track economic performance of fishing fleets, understand cost trends and burdens, and contribute to key metrics such as the calculation of net returns and profits. Data from this survey are intended to inform management decisions mandated by the Magnuson-Stevens Act, the Regulatory Flexibility Act (RFA) and Executive Order (E.O.) 12866. Various iterations of this survey have been implemented by the Social Sciences Branch (SSB) since 2006. Prior to the 2022 survey effort, the last survey was implemented in 2016 for costs incurred during 2015. More information on the 2011, 2012 and 2015 survey efforts, data cleaning processes, and results, can be found in Ardini et al. (2022). Additional details on the 2006, 2007, and 2008 surveys can be found in Das (2013). Cost data summaries from past surveys can be found on the cost data visualization tool.¹ The remainder of this report will focus on the 2022 survey implementation and collection details, data cleaning practices, and results.

B. Sample Population

The 2022 survey sampling frame consists of 2,495 owners of federally permitted commercial fishing vessels in the Greater Atlantic region that were either active in 2021 or 2022.² Each owner was asked to complete a survey for one fishing vessel. In cases where an individual owned multiple vessels and all of their vessels primarily used a “common”³ gear type, one of their vessels was selected at random. Primary gear type was determined by using the gear grossing the highest

¹ Available at: <https://apps-nefsc.fisheries.noaa.gov/cost-data/>

² Collecting data from non-active vessel owners was deemed appropriate for this effort to collect non-operational costs (i.e., Overhead); however, this may be reconsidered in future years given the confusion from vessel owners whether they qualified to fill the survey when they were no longer fishing or considering that those who were not active were often in the process of exiting federal fishing all together.

³ “Common” gear types include: gillnet, handgear, multiple gear, pot/trap, scallop dredge, trawl and were used for the development of the sampling frame.

revenues during the last year the vessel was active. If one of the owner's vessels primarily used an "uncommon" gear type (i.e., hydraulic dredge, longline, seine), that vessel was force selected to receive a survey. This approach was implemented to increase the opportunity for response from low frequency gear types. All 2,495 individuals had mailing address information and 1,972 (79%) included an email address, both of which were obtained from their federal permit application database.

C. Survey Modes

Vessel owners were provided multiple options to complete the survey, following the Dillman Tailored Design Method under a mixed-mode approach (Dillman et al. 2014). This effort utilized the "push to web" method to decrease mailing costs, allow for skip logic, facilitate data processing, reduce errors, and minimize survey burden. For these reasons, the online option was presented to participants first, where individuals could complete the electronic survey either through a web browser or on a mobile device. A QR code was provided on the hard-copy mailed letters to facilitate navigating to the survey on a mobile device. The contact letters and emails under the "push to web" approach also included instructions for scheduling a phone or virtual interview. The 2022 survey marked the first time the interview option was provided, allowing participants increased flexibility and the potential for improved data quality. The last response option was to complete a hard copy survey, which was sent in two of the five mailings to vessel owners.

D. Survey Outreach

This iteration of the survey effort involved a more extensive outreach plan relative to previous years. First, a cost survey landing page was developed—conveying information about the survey's purpose/background, who is being asked to complete the survey, the timing of implementation, and additional reference materials. The site allowed participants to request their survey link which was then emailed by a Cost Survey Working Group (CSWG) member. Along with the landing page, the Cost Data Visualization tool was developed in part to disseminate results to industry and encourage interactions with the cost data, as well as to support fisheries managers and researchers. The tool allows data to be queried by cost category and gear type from the 2011, 2012, and 2015 surveys. Survey data from 2022 has since been added to the tool. Web tools were not the only form of outreach; there were multiple presentations and contacting protocols initiated prior to fielding the survey to increase awareness and boost response probabilities. Specifically, the CSWG provided eight separate presentations from January to April 2023 conveying the importance of participation in the survey effort. Presentations were given to the following groups: The New England Fishery Management Council, the Mid-Atlantic Fishery Management Council, Port Agents, the Cape Cod Fishermen's Alliance, Groundfish Sector Managers, Groundfish Advisory Panel, Scallop Committee, and the Scallop Advisory Panel. The CSWG also had a booth at the 2023 Maine Fishermen's forum which allowed for some participants to fill paper-copy surveys.⁴ Efforts to contact key industry individuals using contact information provided by Social Sciences Branch staff was also accomplished resulting in sending emails or calling around 50 individuals or companies to further raise awareness. These efforts may have, in part, contributed to an overall increase in responses from 2015 to 2022, despite numerous contentious issues (i.e., offshore wind and fishing area closures) that impact the

⁴ There were 2-4 surveys that were filled and returned as a result of the Maine Fishermen's Forum where surveys were physically handed to eligible participants.

willingness of respondents to fill the survey. This level of outreach requires substantial resources in terms of both travel funding and staff time.

E. Contact Protocol

Following the Dillman et al. (2014) methodology, the data collection protocol initially consisted of four email contacts for those who had a valid email address along with four mail contact letters. A decision was made during the data collection period to include a fifth contact email due to an observed uptick in responses after sending out initial contact emails. Once a participant either completed the survey, gave a refusal to participate, or was identified as having an invalid mailing/emailing address, the participant was subsequently removed from future mailings. A total of 72 records in the sample contained duplicate physical mailing address information, which in some cases, represented companies providing vessel owners with bookkeeping services. To reduce burden for these entities, these records were grouped together by address and invitations were mailed in bundles.⁵ Specific contact dates can be found in Table 1.

Computer Assisted Telephone Interviewing (CATI) reminder calls began during the third week of the data collection to solicit participation in the survey, either by mail, web, or by telephone or virtual interview appointments with a CSWG member. CATI callers successfully contacted 741 (30%) individuals, with 354 owners indicating interest in completing the survey⁶ and 387 who refused to participate.

⁵ Each bundle contained individual envelopes for each vessel owner to respect privacy.

⁶ Note that those who indicated their interest in participating did not always end up completing the survey.

Table 1. 2022 cost survey participant contact schedule

Events	Date
Drop Invitation Letter (Week 1)	22-Mar
Initial Email Invitation (Week 1)	23-Mar
Business Bundled letters 1 drop (Week 1)	23-Mar
Drop Reminder Letter 1 (Week 2)	29-Mar
Reminder Email 1 (Week 2)	30-Mar
Business Bundled letters 2 drop (Week 2)	30-Mar
Initiate CATI Reminder Phone Calls (Week 3)	5-Apr
Reminder Email 2 (Week 4)	12-Apr
Drop Reminder Letter 2 + Survey Packet (Week 4)	13-Apr
Bundled cover letters/ packets (Week 4)	13-Apr
Reminder Email 3 (Week 6)	27-Apr
CATI Reminder Calls End (Week 7)	3-May
Final Contact Email (Week 7)	3-May
Final Contact Letter and Survey Packet (Week 7)	3-May
End Data Collection	31-Jul

F. Time Period of Implementation

The first contact letter and email were sent in late March of 2023, providing an overview of the survey and instructions on how to participate in the survey online or by interview. The second contact, (i.e., an email and a mailed letter), was sent one week after the first mailing offering a reminder to participate with the same instructions as the first contact. The third contact was in the form of an email and a mailing and was sent two weeks after the second contact, which included a reminder letter as well as a survey packet. The letter included a reminder of the different modes to participate as well as a notification that the accompanying hard copy survey could be filled and mailed back with the prepaid business reply envelope (BRE) to encourage further participation. The survey packet included a hard copy survey, customized by gear type (see section G: Changes from Previous Survey Implementations for more information on survey versions); a BRE addressed to the NEFSC; a double-sided instruction sheet for completing the survey; a double-

sided handout containing frequently asked questions and previous results; and a separate sheet containing PRA and confidentiality statements. The fourth and final mailing was sent three weeks after the third contact at the beginning of May and included another survey packet with the same materials as the previous mailing.⁷ The online survey portal closed at the end of July.

G. Changes from Previous Survey Implementations

There were several improvements made to the 2022 survey and survey implementation practices with the focus of improving the response rate. One improvement included offering an interview option as a method for participants to complete the survey. This helped connect the CSWG with survey takers on a more personal level and provided the opportunity to clarify any questions the respondent or CSWG might have had regarding survey questions and answers. Another change included creating 10 different gear-based survey versions. In previous years, there was a single survey version that was delivered to all participants. During 2019 summer pre-testing, potential survey respondents suggested they could not see themselves in the survey and that tailored surveys based on gear would help with this issue. The survey questions across the gear types largely stayed the same to retain the ability to aggregate data across gear types, but the examples and survey covers were designed with specific gear types in mind. Some questions, however, were taken out or added in depending on the specific gear types (e.g., bait was not asked in the scallop dredge survey and paralytic shellfish testing was added to the hydraulic dredge version). Vessels which only used a single gear type in their last active year received one of the following surveys: trawl, longline, handgear, hydraulic dredge (either for a large business or small business), seine, gillnet, pot trap, or scallop dredge.

Vessels that used multiple gear types received a more generalized multigear version of the survey. The CSWG collaborated with IBSS, a subcontracting company with the Research Communication Branch of the NEFSC, to create the survey covers containing photos of local vessels and specific gear types. The body of the surveys were designed using methodology described in Dillman et al. (2014), and Snijkers et al. (2013), which includes guidance on question wording, font sizes and styles, color/contrast schemes, symbol/radio button usage, general survey design principles, and more. Collaboration with IBSS also allowed the designing of the instruction sheet and the double-sided results and FAQ sheet. This created a new, cohesive brand for the 2022 cost survey. Another major improvement included decreasing the length and reducing the overall complexity of the survey. One example of this was reducing the trip expenses deducted from crew pay question, which spanned four questions in the 2015 survey, to a single question. Survey complexity was reduced by combining vessel repairs/maintenance with upgrade/improvements. This decision was informed by conversations with NMFS cost survey leads in other regions, observing previous survey respondents having difficulty with the distinction (e.g., recording the same value for engine repairs and engine upgrades), and during the focus groups in the summer of 2019 to gain insights on how to frame challenging questions. The CSWG also evaluated each survey question to ensure a clear end use was identified to facilitate streamlining the survey. In general, survey questions were evaluated as to whether they would help meet the primary goal of the survey: estimating vessel-level profitability.

⁷ The fourth mailing inadvertently omitted a Business Reply Envelope with the survey packet. An additional mailing was sent out the following week containing a Business Reply Envelope and a brief apology letter.

The 2022 survey also targeted implementing the survey around tax season so that vessel owners could readily access their schedule C tax form to assist in filling the survey. This was also accompanied by an assessment of vessel activity which showed March-May being lower than average activity months for many fisheries. Increasing outreach efforts through additional presentation and direct calls to industry members was also implemented during this survey wave. Lastly, implementation was coordinated with the launching of the cost data visualization tool, which went live in December of 2022. This tool provided an outlet for disseminating and highlighting past and future results to be used by both vessel owners and managers alike.

H. Pre-testing

The cost survey halted fielding after the 2015 survey effort given low response rates. Three focus group sessions (New Bedford, MA (N=9); Salem, MA (N=5); and Lakewood, NJ (N=10)) were conducted during the summer of 2019 to help refine survey questions and gain feedback directly from industry members on areas of confusion (Appendix Table 1). It also provided an opportunity to better understand what actions could help increase survey participation in lieu of monetary compensation.⁸ The information from the focus groups fueled the redesign of the next survey iteration. For example, trip expenses, such as fuel, bait, and ice, were added back into the final survey instruments given that industry members questioned the integrity of the research when these questions were missing from the survey. These questions were intended to be excluded so as to avoid duplication with cost information collected by at-sea observers. One piece of feedback acted upon by researchers was the sentiment that industry members could not see themselves within the survey given the one-size-fits-all approach. As previously discussed, the CSWG developed 10 gear-based surveys to mitigate this issue which aimed to highlight specific gear types in examples while maintaining the sameness of each question across gear types.

After the surveys were developed, nine⁹ 90-minute semi-structured cognitive interviews were conducted in late 2021/early 2022 to pre-test the instrument for the following gear types: Multi-gear, Pot/Trap, Scallop Dredge, Handgear, Trawl, and Longline. Participants were recruited by the survey firm Market Decisions using a sampling frame provided by the CSWG based on their gear types and multi or single-vessel ownership. The cognitive interview process included the participant going through each question of the survey and talking through how they would answer each, voicing any questions that came up for them. At the end of each section, the participant would stop and the interviewer would review sections where the individual got stuck or voiced questions to work through finding a solution on how to improve the question. The feedback from these sessions allowed for final adjustments to the instrument before implementation. Specifically, one outcome from the interviews was strong negative reaction to the demographic questions, evoking anger, confusion and conflation with political interests. The reaction was strong enough that these questions were removed from the final survey versions.

⁸ At the time, it was known amongst the CSWG and SSB staff that offering incentives for filling the survey often led to the rejection of the data collection when going through PRA approval via the Office of Management and Budget.

⁹ Only 9 cognitive interviews were conducted for multiple reasons. One being that PRA approval is required for structured interviews for more than 9 participants. Cost and SSB staff time also constrained the number of cognitive interviews conducted.

III. QUALITY ASSESSMENT and QUALITY CONTROL PROTOCOL

A comprehensive quality assessment and quality control (QA/QC) protocol was developed to identify and correct potential data entry errors, inconsistencies, and outliers in the 2022 cost survey (Figure 1, Appendix Table 2). Though there is a lack of consensus around data quality assurance, the CSWG developed an iterative process informed by previous survey data auditing procedures and focused on improving data to meet the survey's primary goal (Groves and Lyberg 2010; Reynolds et al. 2011; Daniel et al. 2018). The protocol includes the identification of outliers, potential column switches, qualitative data investigations, and miscellaneous changes. This section will provide an overview of each of the questions assessed, methods, and decision rules within the QA/QC protocol. These methods will help to inform cost survey data end users as to how the data were cleaned and provide guidance for processing data collected in future cost surveys.

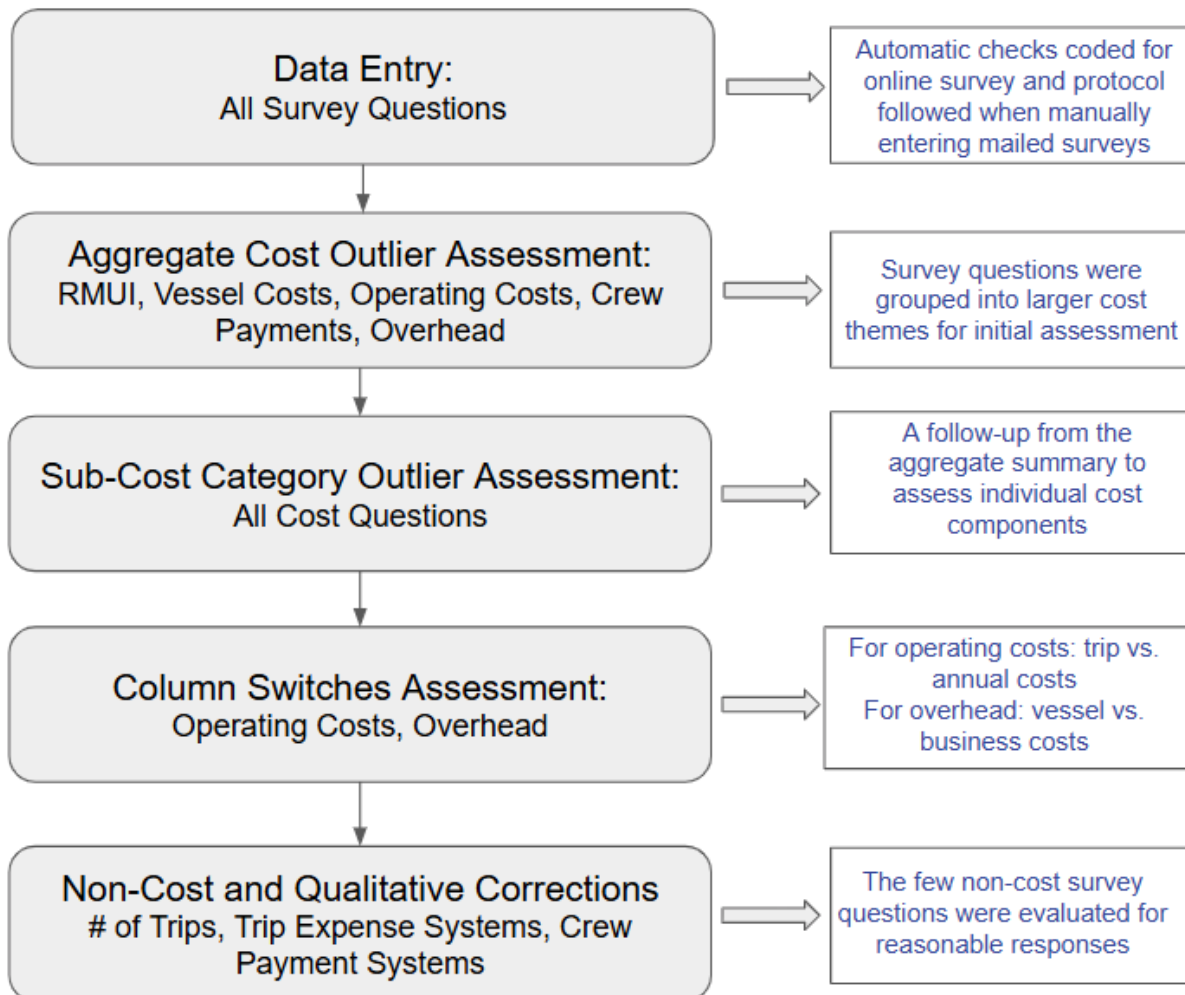


Figure 1. Schematic describing the QA/QC protocol conducted based on the type and structure of the cost survey question being investigated. **Note:** RMUI stands for repair and maintenance and upgrades/improvements.

A. Data Entry

The QA/QC process for the 2022 Cost Survey effort began with coding the online surveys and during the data entry process of the hard copy surveys. The online surveys were designed to limit respondent errors and create automated checks based on specific survey questions. For example, the online surveys used skip logic to avoid questions that did not pertain to certain survey takers. In addition, if information from two fields conflicted, the online survey version prompted respondents to double check their answers. When manually inputting mailed hard copy surveys, a protocol was followed to ensure the most accurate data were being recorded (e.g., if a range of costs were provided the average was taken; if invalid answers were given, answer field was left blank). A full list of these data entry decision rules is listed in Appendix Table 3. A Google Sheet was created to track all manually entered surveys as well as any changes that might have been made to the original entry. Acceptance sampling to ensure quality assurance was conducted by creating batches of surveys, bundled on the date and time of day entered (A.M. or P.M.) to facilitate revisiting surveys if data entry errors were found (Biemer and Lyberg 2003; Franklin and Walker 2010). Two other team members of the CSWG conducted spot checking to review for data entry issues—reviewing 6% (10 surveys total out of 165 hard copy surveys entered) of all surveys following methods used by the World Food Programme (2009). This involved the team members, aside from the person who entered the survey, to fully compare hard copy surveys to the data entered online from each batch to check for errors. The errors assessed included ranges entered, missing data, duplicated data, logic/instructions followed, consistency in answers, and typographical errors (Biemer and Lyberg 2003; Jinks et al. 2003; Munoz 2005; OMB 2006; U.S. Department of Housing and Urban Development 2014; Hansen et al. 2016). There were no data entry errors found from inputting hard copy surveys into the online portal. If an error was found while spot checking a survey, the protocol was to review a subsample (2-3 additional surveys) from that batch. If multiple surveys from a batch had errors, then the entire batch was to be re-entered.

B. Initial Aggregate Cost Category Outlier Assessment

Outlier identification and correction was the first step of the data cleaning process. This process identified outliers (i.e., extreme values) which were potentially caused by data entry errors or mistakes. This was strategically completed first to allow the CSWG to contact the survey taker in these cases and increase the probability of a participant remembering their cost information to rectify the error. The main cost categories were prioritized for investigation given their use in generating vessel-level profitability and informing management decisions. Aggregated calculations (i.e., summed sub-categories) for all major cost groups were assessed including: new/replacement, repair/maintenance, and upgrade costs (Question 3), vessel costs (Question 4), trip expenses (Question 5), crew payments (Question 10 and 11), and overhead costs (Question 12). Survey responses were grouped based on the vessel's primary gear type¹⁰ and informed by summary statistics.¹¹

Given that this analysis was used to identify outliers on the right-hand side of the cost distribution, values of 0 or zero costs, refusals, and ineligibles were excluded from the analysis.¹² The z-scores [$z = (\text{aggregate cost category value} - \text{average}) / (\text{standard deviation})$] were calculated using the full sample mean for each gear type and vessel length within each cost category. After the first z-score calculation was completed, scores over 1 (i.e., greater than 1 standard deviation from the mean) were flagged as outliers and removed from the distribution. New z-scores were then calculated to identify outliers relative to the updated distribution. Values with z-scores of 5¹³ or greater (i.e., +5 standard deviations above the median¹⁴) were also flagged as outliers. Using interquartile ranges (IQRs) for this analysis might have been a more suitable approach as the data is non-normally distributed with a right-handed tail, and standard deviations are typically used for a normal distribution (Madadzadeh et al. 2015). To be consistent with outlier analyses from past survey years, and understanding that using IQRs would most likely not yield substantially different results, the research team ultimately decided to continue using the standard deviation approach.

1. Outlier Correction Protocol

After outliers were identified using the process described above, the CSWG convened to discuss next steps. For each outlier or error identified, decision rules were implemented to adjust values. The CSWG reviewed information about the vessel, such as size, value, and gear type. The team's knowledge and size of distributions (e.g., if there was a long right-hand tail) associated with each cost category were taken into account when determining next steps for identified outliers. For example, the distribution for "overhead costs" contains a wider range of values of fishing businesses associated with this region, such that some data points falling beyond the +5 standard deviation from the median threshold were not considered outliers due to the high variability of costs. In most cases, the values initially identified were not considered "unfeasible" given the range of costs and the vessel information. A conservative approach to altering values was undertaken, such that there had to be high certainty of error to warrant a correction. If column switches (Sec. III, D.) were ruled out and the value was deemed likely an error after comparing to contextual vessel information, there were protocols to either call the participant if they had checked off their willingness to be contacted with follow-up questions (Question 23) or to replace the value with an average calculated by the gear type. Limiting participant follow-ups

¹⁰ Gear type used to yield the highest amount of fishing revenue during calendar year 2022. Overlap in cost distributions across both large and small vessel groups and small sample sizes when grouping data by primary gear type and small/large vessel length led to grouping by just primary gear type. Responses to the survey that did not provide any cost information, refusals, and ineligibles, were removed from this analysis. In addition, aggregated costs of \$0 for certain cost categories were removed from that particular cost categories analysis.

¹¹ Summary statistics based on primary gear type and vessel length generated for each cost category included a count of responses, average, standard deviation, median, minimum, and maximum values.

¹² In the dataset, skips were coded as negative values to separate out true zero costs and null values.

¹³ +/- 5 standard deviations was the protocol established in previous cost data cleaning methods so in an effort to be consistent we followed that protocol for this analysis.

¹⁴ After reviewing both the initial z-score and histogram analysis, it was decided that using a threshold of +5 standard deviations above the median rather than the mean would be more accurate in determining outliers given the skewed distributions of aggregate cost categories.

was deemed important in an effort to decrease burden on survey respondents. The initial contact method was based on the participant's stated preference (Question 23: telephone or email). In the correspondence via emails or on answering machines, the CSWG used caution not to disclose any confidential cost information. If no response was received after initial follow-up calls and emails, a second follow-up was sent one week later. If no response was received, that data point was discussed further by the CSWG to make the final decision about its outlier status. Ten individuals were flagged for follow-up/clarification, of which five vessel owners were successfully contacted (Appendix Table 4). Four of these values were changed to reflect more accurate answers, with one value kept as originally inputted. Out of the five individuals where no contact was made, four values were updated and one value was kept as is. An additional check was also put into place to review the entire survey response if a keystroke error was discovered to investigate other potential keystroke errors, however, no additional corrections resulted from this approach.

2. Outlier Replacement Values

In cases where an individual was unable to be contacted and the record was deemed to be extreme beyond reasonable doubt by the CSWG, outliers were replaced with the average value for that aggregate cost category and gear type. In the case that average total annual costs were calculated and if a particular gear type did not have enough responses for that particular question, the average for all gear types was used. End users are advised to take these changes into consideration when using the data for various research purposes and use their discretion to account for outliers. The remaining outlier values were adjusted properly based on decision rules described below.

C. Sub-cost Category Assessment

Outliers were also investigated at the sub-cost category level given the differences in magnitude of costs within cost categories. This allowed for a more rigorous identification of single-record data entry errors that were initially overlooked. Specifically, the individual components of each of the major cost categories were investigated independently. This included the sub-cost categories for repair and maintenance/upgrade and improvement category listed in Question 3 (i.e., propulsion engine, deck equipment, haul-out costs, hull, fishing gear, wheelhouse electronics, processing/refrigeration, and safety equipment costs), vessel costs (Question 4) (i.e., mooring/docking fees, permit fees, vessel or permit payments and vessel insurance), trip expenses (Question 5) (i.e., fuel, bait, food, ice, catch handling, and at-sea processing), and overhead costs (Question 12) (i.e., business vehicle costs, business travel costs, association fees, legal expenses, additional labor payments, advertising costs, communication costs and office/storage expenses). Additionally any remaining cost or revenue related values that were not initially incorporated into an aggregate cost category, including total payments made to crew and hired captains (Question 10), benefits paid to crew and hired captains (Question 11), the estimated market value of the vessel (Question 15), the estimated market value of fishing permits and history associated with the selected vessel (Question 16), and quota costs and revenues (Question 17, 19, and 20) were also assessed for potential errors.

Histograms were generated creating distributions at the gear-level (trawl, handgear, pot/trap, and "other" which included the remainder of the gear types due to low sample sizes) to visually identify outlier values at the sub-cost category-level. Any values that were identified as outliers were reviewed and updated using the same strategies as those discussed in the

Outlier Correction Protocol (Sec. III, B, 1.) and Outlier Replacement Values (Sec. III, B, 2.) sections. The overhead and trip costs categories went through an additional set of screening criteria relating to column switches and are fully described in the next section.

D. Column Switches Assessment

1. Overview

There were two sections of the survey, trip costs (Question 5) and overhead costs (Question 12) where columns were used to either get an aggregate value or single-unit value for a specific cost. For trip costs, the participant was asked to either provide their total annual trip cost for the vessel or their average cost for each trip. The latter could then be multiplied by the number of trips to obtain the total annual trip cost for the selected vessel. Providing an option to fill out average cost per trip was suggested by some individuals during pre-testing for costs such as bait and fuel. Likewise, in the overhead section, individuals were asked to either provide their total annual overhead costs for the selected vessel or their total annual costs across all owned vessels, along with the total number of vessels owned. The annual cost for all vessels owned can then be divided by the number of vessels owned to obtain the annual overhead costs for the selected vessel. Similarly, this was suggested during pre-testing given that not all participants could apportion costs to the selected vessel. While some survey participants chose to complete the survey using the newly-introduced options, the columns did introduce errors for a handful of participants (Figure 2). In the data entry process, it became apparent that survey respondents may have unintentionally switched the values for the columns, for example writing the average trip cost in the total annual cost column or vice versa.

Given that the column switches were occurring on the sub-category level (e.g., total annual fuel costs and average trip-level fuel costs) a full analysis of all sub-cost categories was undertaken for both the trip costs and overhead cost section. Additional steps were taken during the sub-cost category outlier assessment to specifically investigate potential cases of this column switch error. Specifically, the visual histogram assessment of gear-level sub-cost categories, discussed in the Sub-cost Category Assessment section (Sec. III, C.), was conducted four separate times—one for each column value. This included histograms assessing the total annual trip costs, the average trip costs, the total annual overhead costs for the selected vessel, and the total annual overhead costs for the entire fishing business. Along with visually identifying outliers, a tally of vessels which reported the top three highest values for each sub-category was also generated to track vessels incurring systematically higher costs, and to help discern whether columns were switched or not.

5. Please provide your **total trip costs** by category **OR** the **average cost per trip** (best estimate) if that amount is easier to provide, for the selected vessel incurred in 2022.

Do not include costs if they were captured in mooring/docking fees (Question 4).

Trip Cost Category	Total 2022 Cost for the Selected Vessel	OR	2022 Avg. Cost per Trip	OR	Check Box if NO Cost in 2022
Fuel	\$.00		\$.00		☐ No Cost
Bait including shore-side baiting labor costs if applicable	\$.00		\$.00		☐ No Cost
Food for captain and crew	\$.00		\$.00		☐ No Cost
Ice including purchases or cost of making ice	\$.00		\$.00		☐ No Cost
Catch Handling costs for auction, lumping, grading, shipping/trucking, and unloading. <i>Please only include costs directly incurred by the vessel. Do not include costs that were captured in ex-vessel prices.</i>	\$.00		\$.00		☐ No Cost
At-sea Processing, At-sea Boxing/Packaging	\$.00		\$.00		☐ No Cost

12. Please record **all overhead costs associated with this vessel only** that were incurred in 2022.

If you own multiple vessels and you are not able to provide overhead costs associated with the selected vessel, please report the total overhead costs for your fishing business in the "Total Cost for All OWNED Vessels" column.

Category and Examples	Total 2022 Cost for the Selected Vessel	OR	Total Cost for All OWNED Vessels	OR	Check Box if NO Cost in 2022
Business Vehicle Costs including mileage/fuel, insurance, maintenance and financing apportioned to fishing business-related purposes only	\$.00		\$.00		☐ No Cost
Business Travel Costs including lodging and travel expenses for business-related activities, excluding business vehicle costs and trucking/shipping costs	\$.00		\$.00		☐ No Cost
Association Fees Paid including co-operative, fishing organization, sector fees, and union dues	\$.00		\$.00		☐ No Cost
Legal Expenses Paid including settlement and legal fees	\$.00		\$.00		☐ No Cost
Additional Labor Payments including payments to accountants, office administrative assistants, bookkeepers, and night watchmen	\$.00		\$.00		☐ No Cost
Advertising Costs	\$.00		\$.00		☐ No Cost
Communications Costs including cell/landline phones, office radio, VMS operational fees (<i>not including the cost of new/upgraded VMS systems</i>) etc.	\$.00		\$.00		☐ No Cost
Office/Workshop/Storage Expenses including office/workshop supplies, office utilities (electric, heat, internet, etc.), rental of office/shed/freezer space, excluding communication costs	\$.00		\$.00		☐ No Cost

Figure 2. Examples of questions posing potential column switches (Question 5 and 12) in the cost survey for 2022

For extremely high values, the record was assessed and mechanisms were used to identify if a potential column switch took place. If sub-cost category values were identified as high relative to

the distribution, supporting information for the record including the vessel size, length, and value of the vessel, were considered in determining if the value was potentially a column switch. In some cases, a column switch was identified, when all of the values in the question were off by an order of magnitude. This was most commonly observed in Question 5 where the average trip cost and the total annual trip costs were switched. This was identified when assessing the distributions for those that responded to the average cost column with total annual values, given that the totals are much higher than the average and thus were easier to identify. It should be noted that some column switches were easier to identify than others, for example, identifying total costs mistakenly placed in the average trip column were easier than identifying average costs placed in the total cost column. This is because it is difficult to determine when a low value is reasonable or not given the lack of a left-hand tail. Despite this challenge, the lowest quartile for each question and variable was also assessed at the gear-level to identify potential errors.

2. Additional Trip Costs Corrections

In addition to the column switch work discussed in the previous section, there were additional checks conducted on trip costs to correct data errors. For example, if a vessel reported being active in 2022 but had an average or total fuel cost of zero, the average trip-level fuel cost by gear type was calculated and then multiplied by the number of trips reported by that vessel to obtain the total annual fuel costs for the vessel. This only occurred for one record. The total annual fuel cost was also investigated and replaced if the value was not feasible given the number of trips reported. For example, if a participant reported a cost of \$30.00 for the year but the vessel took 22 trips, this would mean the average fuel per trip was less than \$2.00 per trip. This occurred only twice in the dataset. Other extreme low values were assessed for the remaining trip costs at the annual level; however, no changes were implemented. Unreasonably low values were also assessed for vessels that reported values at the average cost per trip level as well. This was investigated for average fuel cost by assessing if there were any cases where the average cost of food was greater than the average cost of fuel, for which there were no cases. Again, if a vessel took multiple trips and they had no cost for average fuel (not including skipping the question) or if their cost recorded was below \$10, the response would be flagged to denote further discussion. There were no occurrences for this flag and there were no records of concern in the dataset.

3. Additional Overhead Cost Corrections

A similar approach to the trip cost section was taken for the overhead cost section, but in this case, total annual overhead for the selected vessels and total annual overhead cost for the businesses (i.e., the cost associated with all vessels) were assessed by sub-cost category and gear type. Total annual overhead costs were assessed specifically to identify outliers where an individual may have not apportioned costs to the selected vessel indicated by an extremely high value in this column. These cases were only identified for survey participants that noted that they owned more than one vessel, because if an individual switched columns and only had one vessel, the costs would still be equal. Extreme low values were assessed for this column, but none were outside of the range to warrant a change in the source data. As for the total annual overhead costs reported for the business, extremely high values were assessed for completeness; however, a column switch would indicate that an individual accidentally placed vessel-level costs in this column rather than costs for the entire business. This is such that lower values were more likely in these cases of column

switches and are, therefore, more challenging to confirm given that they tend to fall within the range of potential correct values. No changes resulted from the assessment of responses to total business-level overhead costs.

E. Miscellaneous Data Corrections

Miscellaneous changes implemented to the data included single-case corrections such as if a vessel owner filled out the survey for a different vessel from what was originally in the sampling frame. These cases were identified by the survey taker noting this on the survey itself, or the participant calling and discussing this decision with a CSWG member prior to filling the survey. In these cases, the information pertaining to the vessel in the sampling frame and the response dataset were altered to the vessel for which the survey was filled. Another example includes an assessment of the answers provided to Question 21, which intended to capture any additional costs not collected in the survey. In cases where an individual filled in additional costs, the CSWG verified that the costs provided were costs which were not queried in the survey or if the cost described fit within a question already provided in the survey. This was accomplished by systematically coding all cost descriptions provided in Question 21 in a separate excel file and determining if the cost should be included in an existing section of the survey. Any cost that was ruled to fit into an existing section was added to the appropriate question of the survey and was subsequently deleted from Question 21 along with the description to avoid double counting. If the cost and description were not collected within the survey, both variables were retained in the final dataset and noted for future consideration.

F. Non-cost and Qualitative Question Corrections

After the core cost data were analyzed for outliers, data entry errors, and column switches, additional steps were taken to assess the remaining qualitative and non-cost related questions for errors. For example, there were a handful of multiple-choice questions, including: costs deducted from crew pay (Question 6), how trip costs are paid (Question 7), crew payment method used (Question 9), and quota payment system (Question 18) which offered “other” as a potential option. If “other” was selected for any of these questions, the participant had the option to also write in a description. For example, if “other” was selected on Question 9, suggesting they used a method other than a share or flat rate system to pay crew, the participant may have written “I pay my crew in fish” in the description box associated with “other.” In some cases, however, participants selected “other” when their selection fit within one of the other multiple-choice options presented. To correct these cases, any selection of “other” was flagged for discussion if the comment left could be another answer choice that was presented. The CSWG discussed all flagged comments and came to a decision regarding how to properly categorize the answer provided. In the cases where the answer was deemed to fit within one of the existing multiple-choice options, the record was changed from “other” to the correct multiple-choice option and the description was removed from the record. Additionally, “other” comments that were inputted from hard copy surveys during the data entry process included targeted notes from the individual who manually inputted these responses online to note how to categorize some responses more accurately.

There were additional non-cost related questions which were not multiple choice that required further examination for data entry errors. One example was the number of commercial trips taken

(Question 2), where extreme values were flagged using a visual histogram assessment and later compared to vessel trip reports and dealer data to ground truth the value. There were a few cases where a value was off by an order of magnitude. For example, the survey response reported 700 trips when other data sources, such as vessel trip reports, suggested 70 trips were taken. Given that there were only 3 records that were visually identified as potential errors, and the values were all off by an order of magnitude, they were corrected to the number presented on the vessel trip reports.

In the survey, the number of vessels owned by the survey participant that took commercial trips is presented in Question 14 and is intended to be used for allocating costs to the vessel-level when a participant provided their total costs for the business in the overhead section of the survey. If inconsistencies were identified when comparing the number of vessels that took commercial trips relative to the answer provided in Question 2, this value was changed to match the answer provided in Question 2. For example, if the vessel owner provided an answer greater than “1” for Question 14, but answered Question 2 by stating that their vessel was “inactive” or “this vessel did not take any commercial trips in 2022, but did take recreational or other types of trips”, Question 14 was changed to “0” given their prior answer.

G. Data Processing Code and Storage

The cleaning processes were carried out by multiple CSWG members at different times and on different statistical computing software. The intention of this document as well as the protocol itself, is multifaceted: 1) to ensure end users are aware of the data processing practices that took place to best use the data for their unique research and analytical purposes 2) streamline and inform future implementations of the Greater Atlantic Region Commercial Fishing Business Cost Survey and 3) to contribute to the larger literature of data processing practices. To best meet intention 2, retaining the code for the processes described in this report is imperative. For that reason, a GitHub repository¹⁵ was generated to store all the code related to the cleaning processes described here such that these practices can be implemented and refined in the future.

IV. SURVEY RESPONSE

A. Ineligibles, Refusals and Non-respondents

The sampling frame for the cost survey included 2,495 individual owners for which a vessel had been preselected using predominantly random sampling methods (See section II. B. Sample Population). Of these vessel owners, 18 were identified as ineligible during implementation, 2 of which included comment data and one had notes associated with why they were ineligible such that these records were subsequently retained in the final dataset. Those that were ineligible were mainly cases where the owner sold their vessel, the vessel owner sold their federal permits prior to the beginning of 2022, or the owner was deceased. There were an additional 84 individuals with mailing addresses that were not valid, such that the survey was undeliverable (3.37% of the sample). There were also 41 participants who had refused to take the survey. Of the 41 refusals, 13 were submitted using the survey either online or through paper copy as opposed to refusing via

¹⁵ Please reach out to the authors for the GitHub repository access

the hotline or emailing the helpdesk. The returned refusals are retained in the final dataset as they often offer contextual insights around the refusal.

There were a total of 422 returned/submitted surveys, of those, 339 surveys had filled Question 22 or beyond (not including comments and excluding skips), 367 surveys had at least one cost question completed (excluding skips), and 406 surveys had at least one field in the survey populated. The remaining 16 returned surveys in the dataset contribute to the categories previously discussed (13 refusals and 3 ineligible). The remaining portion of the sample (1,946) are considered non-responders (Table 2).

Table 2: Records of survey completed, undeliverable, refusal, ineligible and non-responder frequencies and percentages

Outcome	Records in Dataset	Records Not in Dataset	Total	Percent (%)
Complete or partially complete survey	406	–	406	16
Undeliverable	–	84	84	3
Refusal	13	28	41	2
Ineligible	3	15	18	1
Non-responder	–	1,946	1,946	78
Total	422	2,073	2,495	100
Valid Sample (Sample - (Undeliverables + Ineligibles))	–	–	2,393	–

B. Response Rates

There are multiple approaches to calculating response rates. First, what constitutes a complete response must be defined. In previous reports summarizing cost survey efforts, a complete survey was defined as any survey with at least one cost question, either quantitative or qualitative, filled from a participant within the valid sampling frame (Question 3-12; 17-22). In the final dataset, there are 367 records which qualify under this definition which we will refer to as Complete 1 for the remainder of this report. The remaining 39 records are labeled as “partials” given that they had at least one field of the survey filled but no cost information was provided. A more conservative definition was also generated for this implementation, where Complete 2 is defined as any survey where Question 22 or beyond was filled with information, excluding skips or comments, within the valid sampling frame. Under this definition there were 339 records and 67 partials (Table 3). In the calculation of response rates, we use both Complete 1 and Complete 2 to provide an upper and lower bound of these rates.

Table 3. Survey complete counts

Variable Name	Definition	Complete Responses	Partial Responses	Total Valid Surveys (Complete + Partial)
Complete 1	Surveys with at least one cost question filled	367	39	406
Complete 2	Surveys with Question 22 or beyond filled (excluding the comments field)	339	67	406

1. Response Rate Calculations

The American Association of Public Opinion Research (AAPOR)¹⁶ method was used to calculate two sets of response rates (RR1 and RR2) (Table 4). RR1 and RR2 were calculated using the definition of Complete 1 and Complete 2 to provide an upper bound and lower bound, respectively. Using Complete 1, where at least one survey question was filled, RR1 is 14.82%. RR1 using Complete 2 is slightly lower, given that it uses a more conservative definition of qualifying as a complete survey at 13.69%. The calculation of RR2 using either the Complete 1 or Complete 2 definition yields the same result at 16.39%.

Across all calculations, the response rates range between 14%-16%. Overall, these response rates are lower than the survey target response rate (30% response rate in the initial project proposal). Over the lifespan of the Cost Survey, response rate has varied ranging from a high of 28.9% in 2011 to a low of 6.4% in 2015 (Appendix Table 5). The overall average from the six survey years (2006-2008; 2011-2012; 2015) is 16.75%. Preliminary findings exploring the representativeness of the cost data are presented in the Results section (V.A. Non-Response Bias Testing) to help interpret the information as well as assist in planning for future survey sampling strategies.

¹⁶ Website source accessible at: <https://aapor.org/publications-resources/education-resources/response-rates>

Table 4. Response rate calculations for the 2022 cost survey using the American Association of Public Opinion Research response rate calculator

Response Rate Title	Formula	Numeric Formula	Response Rate
Complete 1: RR1	$I/((I+P)+(R+NC+O)+(UH+UO))$	$367/((367+39)+(41+1,946+0)+(0+84))$	14.82%
Complete 1: RR2	$(I+P)/((I+P)+(R+NC+O)+(UH+UO))$	$(367+39)/((367+39)+(41+1,946+0)+(0+84))$	16.39%
Complete 2: RR1	$I/((I+P)+(R+NC+O)+(UH+UO))$	$339/((339+67)+(41+1,946+0)+(0+84))$	13.69%
Complete 2: RR2	$(I+P)/((I+P)+(R+NC+O)+(UH+UO))$	$(339+67)/((339+67)+(41+1,946+0)+(0+84))$	16.39%
Definitions: I=Complete, P=Partial, Complete, R=Refusal, NC=Non-Contact, O=Other, UH=Unknown Household, UO=Unknown Other.			

2. Responses per Survey Mode

To summarize responses by survey mode, gear type, and Fishery Management Plan (FMP), the CSWG used the definition of Complete 1 to describe a complete record. Across the three survey modes, the online mode had the most responses with 187 (51%) records, followed by mail with 148 surveys (40.3%), and, lastly, interviews with 32 (8.7%) records (Table 5). In previous years, surveys were mainly completed by mail, demonstrating a shift in preference for response mode (Ardini et al. 2022). The interview mode also had a non-negligible number of respondents, suggesting this is a helpful mechanism for increasing responses and in meeting the needs of participants.

Of those that completed the survey online, 74 (39.6%) participants used a smartphone and 113 (60.4%) used a desktop, demonstrating the importance of offering a diversity of online platforms to complete the survey (Table 6). In addition, the high number of mobile users observed may have been a result of using QR codes which were provided in the mailed letters. The online survey version also provided information on how long a survey participant took to complete the survey. Smartphone users took an average of 29.5 minutes and desktop users an average of 28.4 minutes to complete the survey (Table 6). This is about half of the time anticipated it would take participants to complete the survey, however, the initial estimate of 60 minutes includes the time it might take for individuals to collect their records. In future surveys, conveying the time it takes to complete the survey, rather than the time it takes to fill and gather cost resources, should be considered.

Table 5. Response rate by survey mode

Mode	Responses (n)	Percent Complete (%)
Interview	32	8.7
Mail	148 ¹⁷	40.3
First Survey Packet	131	88.5
Second survey Packet	17	11.5
Online	187	51.0
Overall	367	100

Table 6. Response rate by device for online survey mode

Device ¹⁸	Responses (n)	Percent Complete (%)	Average Duration (minutes)
Smartphone	74	39.6	29.5
Desktop	113	60.4	28.4
Overall	187	100	29.0

3. Response by Primary Gear and FMP

The primary gear type for each vessel was derived from the top earning gear from when the vessel was last active (either 2021 or 2022).¹⁹ The average response, as defined by the Complete 1 definition, across all gear types was 15% (Table 7). This is the case when comparing either the original sampling frame or the sampling frame after removing ineligible. Surprisingly, the highest responding gear type by percent is “Unknown,” with 10 out of the 46 or 45 sampled vessel owners who responded to the survey (22%)²⁰. Handgear and longline vessels had the next highest response in terms of percentage with 19% response rate each, and 81 and 6 responses by count, respectively. Pot/trap gear users had a low response rate relative to past survey years (14%) despite having the largest quantity of responses, overall (198). Gillnet was especially low with only a 9-10% response rate depending on the sample number used (10 responses). Both pot/trap and gillnet gear users may have experienced recent management implications and financial hardships which could have contributed to lower response rates. Scallop and hydraulic dredge are particularly difficult groups to connect with, however, pointed outreach and

¹⁷ The hard-copy surveys were marked prior to mailing to enable tracking between the first and second mailed survey packets. There were 131 surveys received from the first survey packet (mailed in week 4) and 17 returned using the second survey packet (mailed in week 7).

¹⁸ No eligible responses were received from tablets.

¹⁹ The gear type used in this analysis was derived during the development of the sampling frame which used both Vessel Trip Report and Dealer Data.

²⁰ The unknown gear types are all cases where the only gear type associated with the vessel was equal to 999 for the NEGEAR variable, such that no other gear type was reported for the vessel in the last year active.

presentations at Scallop Advisory Panel meetings may have contributed to the 12% response rate for the scallop dredge group. We also provide results by FMP by regrouping responses, based on the highest revenues earned by FMP group. The highest response rates by FMP included Atlantic Herring (66.7%, n=4), Summer Flounder, Scup, and Black Sea Bass (20.3%, n=32), and Highly Migratory Species (19.8%, n=41) (Table 8). The lowest response rates resulted from Spiny Dogfish (9.3%, n=4), and Small-mesh multispecies (0%, n=0). Additional response rates may be calculated depending on how the researcher defines the sample and response groups. For example, recalculating response rates for a vessel that had any landings of a specific species from an FMP may be of interest when doing management-specific related analyses.

Table 7. Response rate by primary gear type

Primary Gear Group	Sample (N)	Sample (Ineligible Removed)	Response (n)	Response (%)	Response (%) Ineligibles Removed
Dredge Scallop	232	230	28	12.1	12.2
Gillnet	106	104	10	9.4	9.6
Handgear	421	417	81	19.2	19.4
Longline	32	31	6	18.8	19.4
Pot/Trap	1,439	1,434	198	13.8	13.8
Seine	23	23	3	13.0	13.0
Trawl	196	193	31	15.8	16.1
Other (Hydraulic Dredge or Unknown)	46	45	10	21.7	22.2
Overall	2,495	2,477	367	14.7	14.8

Table 8. Response rate by primary fishery management plan

Primary Fishery Management Plan	Sample (N)	Sample (Ineligible Removed)	Response (n)	Response (%)	Response (%) Ineligibles Removed
ASMFC FMP (Non-Lobster)	165	162	27	16.4	16.7
ASMFC FMP (Lobster)	1,357	1,352	186	13.7	13.8
Atlantic Herring	6	6	4	66.7	66.7
Bluefish	23	23	4	17.4	17.4
Highly Migratory Species	207	205	41	19.8	20.0
Mackerel, Squid, and Butterfish	69	68	8	11.6	11.8
Northeast Multispecies	61	59	9	14.8	15.3
Sea Scallop	240	238	28	11.7	11.8
Skates	21	21	3	14.3	14.3
Small-Mesh Multispecies	4	4	0	0.0	0.0
Spiny Dogfish	43	42	4	9.3	9.5
Summer Flounder, Scup, Black Sea Bass	158	158	32	20.3	20.3
Other (Tilefish, Surfclam, Ocean Quahog, SERO FMP, Monkfish, Deep-Sea Red Crab)	49	49	6	12.2	12.2
No Federal FMP	92	90	15	16.3	16.7
Overall	2,495	2,477	367	14.7	14.8

V. RESULTS

A. Non-Response Bias Testing

It is important to understand the impacts of non-response bias, especially when creating summaries that lend insight into the larger population. Preliminary tests were conducted to investigate potential drivers of non-response bias and the overall impact on the representativeness of the data. Specifically, the Representativeness Indicator (R-Indicator) developed by Schouten and colleagues (see Schouten and Cobben 2007; Schouten et al. 2009; Shlomo et al. 2012; Schouten and Shlomo 2017) was implemented to understand the overall representativeness of the 2022 cost data and the potential drivers of non-response using a vector of response propensities. The R-Indicator is a score ranging from 0-1 and is calculated using the following equations:

$$R(\rho) = 1 - 2S(\rho)$$

Where ρ is a vector of response propensities

$$S(\rho) = \sqrt{\frac{1}{N-1} \sum_{i=1}^N (\rho_i - \bar{\rho})^2}$$

And S is the standard deviation of those response propensities

The vector of response propensities was estimated using a probit model, where the left-hand variable is binary indicating a response (1) or a non-response (0). In this case, a record is counted as “responding” if they answered at least one cost-related question in the survey. Given the binary nature of the dependent variable, this type of analysis requires information about the respondents and non-respondents. The auxiliary variables capture vessel-related information which were retrieved from commercial dealer records, permit application data, and vessel trip report databases. The full list of auxiliary variables includes: vessel horsepower, vessel gross tons, average crew per trip, vessel age, a categorical variable of home port state, vessel total annual revenue, number of trips taken when last active, percent of revenues earned by primary gear, last year active (indicator variable, 2021 or 2022), multiple gear usage (indicator variable), primary gear based on highest revenues earned when last active (categorical variable) for both survey respondents and non-respondents. All continuous variables were logged.

Preliminary probit model results suggest low model explanatory power with a pseudo R-squared of 0.021 and only two statistically significant coefficients (Table 9). The two statistically significant coefficients include the vessel revenue variable (0.039) which is statistically significant ($P < 0.1$) and the home port state variable (-0.282) which is highly statistically significant ($P < 0.001$). This suggests that those who have higher revenues are slightly more likely to respond to the survey and those who have a home port in Maine are less likely to respond to the survey, all things equal. Though the results suggest that those who are homeported in Maine are less likely to respond to the survey, it is not clear how this may impact costs. In other words, if cost structures are more or less homogenous across states, this may not bias the resulting costs. Further work will be conducted using the R-Indicator method, potentially by removing pot/trap vessels from the sample given their large percentage of total respondents. Conducting analyses by gear type is not

advised given low counts in both responses and non-responses. Finally, the R-Indicator calculated using these propensity scores equates 0.901 from a scale of 0-1 where 1 is completely unbiased. Overall, this demonstrates that reported costs are most likely only slightly impacted by selection bias when assessed at the aggregate level. Despite this finding, additional bias testing would be ideally completed at fleet-levels, however low sample sizes make this impossible. This caveat should be considered when using the data for cost modeling or applying averages to summarize the population.

Table 9. Probit model and representativeness indicator preliminary results for the 2022 cost survey data

Variable	Coefficient	Robust std. err.	z	P>z	[95% conf.	interval]
In Vessel Horse Power	-0.048	0.073	-0.650	0.513	-0.192	0.096
In Gross Tons	-0.048	0.049	-0.980	0.328	-0.144	0.048
In Crew	-0.038	0.079	-0.480	0.635	-0.193	0.118
In Vessel Age	0.005	0.050	0.100	0.924	-0.094	0.103
In Vessel Revenue	0.039	0.020	1.930	0.054	-0.001	0.078
In N Trips	-0.055	0.038	-1.450	0.148	-0.128	0.019
Primary Gear Group (Pot/Trap)						
Dredge (Hydraulic)	0.126	0.383	0.330	0.742	-0.625	0.877
Dredge (Scallop)	-0.214	0.138	-1.550	0.122	-0.485	0.057
Gillnet	-0.235	0.173	-1.360	0.173	-0.573	0.103
Handgear	0.117	0.116	1.010	0.313	-0.110	0.343
Longline	-0.167	0.239	-0.700	0.484	-0.636	0.302
Seine	-0.065	0.325	-0.200	0.841	-0.703	0.573
Trawl	-0.039	0.134	-0.290	0.775	-0.302	0.225
Unknown	0.561	0.778	0.720	0.471	-0.964	2.086
Home Port State (MA)						
Other	0.033	0.085	0.390	0.696	-0.133	0.200
ME	-0.282	0.087	-3.230	0.001	-0.453	-0.111
In Percent Revenue from Primary Gear	-0.043	0.062	-0.700	0.484	-0.165	0.078

Multiple Gear Use	-0.239	0.106	-2.260	0.024	-0.446	-0.032
Last Year Active						
2022	0.208	0.121	1.720	0.085	-0.029	0.445
Constant	-0.656	0.526	-1.250	0.213	-1.688	0.376
Number of Obs.	2491		Wald chi2(19)	45.71		
Log pseudolikelihood	1044.57		Prob > chi2	0.001		
Pseudo R2	0.021		R- Indicator	0.901		

B. Cost Data and Returns Summaries

After implementing the data processing protocol described in the previous sections, the cost survey data were databased on Oracle and the corresponding metadata has been made available on GitHub²¹. Cost summaries are provided on the cost data visualization tool. Additionally, profit snapshots from those that responded to the 2022 survey have also been made publicly available²².

Overall, costs for 2022 follow similar trends when assessing all costs reported on the survey at the aggregate level. Specifically, about half of the vessels that responded to the 2022 survey (52%) had total costs (excluding operating costs) ranging from \$0-\$100,000. This is in line with the last three data collections (2011, 2012 and 2015) where 53% to 62% of vessels fell within this range. There are 22% of vessels that incurred costs ranging from \$100,000 to \$200,000, in all years surveyed, including 2022. A slightly higher percentage of vessels had costs greater than \$200,000 in 2022 relative to other years, with 26% of vessels falling in this bin compared to only 16%-25% of vessels over the past three years. Though there are similarities when assessing the data in aggregate, differences in annual costs emerge when comparing individual cost categories across the different gear types. For example, of the five gear types represented, three groups (handgear, pot/trap, trawl) showed an increase in the percentage of vessels within the highest cost bin for total repair and maintenance costs during 2022. The increased frequency of vessels in the highest cost bin is relative to all previous survey years (2011, 2012, 2015)²³. This is driven by overall higher costs across all sub repair and maintenance cost categories for pot/trap and handgear vessels. The vessel cost category includes costs such as mooring, insurance, and permit fees. Vessel costs in 2022, in terms of number of vessels incurring certain cost bands, are relatively similar when compared to earlier years when assessed by gear type.

The trends in overhead costs differ by gear-type. Pot/trap vessels more frequently reported higher overhead costs in 2022 relative to other years, driven largely by higher business vehicle usage

²¹ Metadata accessible at https://nefsc.github.io/READ-SSB-ORACLE_COST_SURVEY_METADATA/

²² Available at: https://nefsc.github.io/READ-SSB-Vessel_Profit_Snapshots_2022/

²³ Values on the Cost Data Visualization Tool were adjusted to 2024 constant dollars at the time of this summary.

costs. A larger proportion of handgear and dredge vessels incurred lower total overhead costs in 2022 relative to other years while trawl vessels demonstrate relatively consistent trends over time.

As indicated by the 2022 Profit Snapshots website²⁴, average vessel-level costs, including trip costs, incurred in 2022 are highest for scallop dredge and trawl vessels and lowest for gillnet and handgear vessels (Table 10). The order from highest to lowest cost gear group is similar when using median values with the exception of trawl vessels having the highest median costs instead of scallop dredge²⁵. The vessel gear types with the highest average costs (scallop dredge, trawl) notably have high proportions of crew payments in their cost portfolio, encompassing over 35% of their total costs during 2022. Trip expenses are the largest share of costs in the gillnet (37.0%) and pot/trap (34.1%) groups.

Table 10. Total cost (USD) by primary gear from 2022 vessel profit snapshots

Gear	Mean (\$)	Median (\$)
Dredge Scallop	641,177	393,515
Gillnet	129,621	130,338
Handgear	66,257	28,852
Longline	278,782	C*
Pot/Trap	216,086	172,282
Trawl	633,742	497,358

C* indicates data not presented to protect confidentiality.

C. Vessel and Trip Statistics

In the following section, we outline additional information that is not provided in detail within the Cost Data Visualization Tool or the 2022 Profit Snapshots website. There were 322 (90.5%) vessels that were commercially active during 2022, as indicated by Question 2 (n=356), and responded to at least one cost-related survey question (Table 11). There were 23 (6.5%) vessel owners who were completely inactive in 2022 and 11 (3.1%) who did not take any commercial or shellfishing trips in 2022 but did complete recreational or other types of trips. Of those that were commercially active, the average number of trips was 77.6 with a standard deviation (SD) of 61.2, demonstrating a wide distribution of activity from participants (Table 12). The average year in which vessels were acquired was 2007 with an SD of 11.9 years and the median year acquired was in 2008.

²⁴ Available at: https://nefsc.github.io/READ-SSB-Vessel_Profit_Snapshots_2022/

²⁵ Values reported on the Profit website are provided in 2022 nominal dollars.

Table 11. Vessel activity

Vessel Activity	Responses (n)	Percent (%)
Commercial	322	90.5
Inactive	23	6.5
Recreational or Other	11	3.1
Total	356	100

Table 12. Year acquired and number of commercial trips

Variable	Responses (n)	Mean	Median	Standard Deviation
Year Acquired	358	2007	2008	11.9
Commercial Trips	322	77.6	69	61.2

D. Vessel Insurance

The average vessel insurance cost, including the annual premium paid for hull (i.e., hull and machinery) and protection & indemnity, reported for 2022 was \$10,893.18 for the 332 owners that responded to this question (Table 13). The standard deviation was \$19,441.21 and a median value of \$4,000, showing the extreme skewness of the distribution with a long right-hand tail. This is to be expected given the various vessel sizes and gear types in the sampling frame. The average number of months insured was 11.6 months with a range of 4 to 12 months. The vast majority (91.3%, n=294) were covered for the full 12 months of 2022. There was a high number of vessels (n=189) that were laid up for a number of months during 2022, with an average of 4.3 months and standard distribution of 2.3. This supports the concept of vessels remaining fully insured even while out of the water. During pre-testing, some individuals mentioned that insurance coverage is needed most when they are laid up given potential risks posed by boat yards.

Table 13. Vessel insurance cost, months, and number of months vessel was laid up

Variable	Responses (n)	Mean	Median	Standard Deviation
Vessel Insurance Cost (\$)	332	10,893.2	4,000	19,441.2
Vessel Insured (Months)	322	11.6	12	1.4
Vessel Laid-up (Months)	189	4.3	4	2.3

E. Trip Cost Payments

Question 5 investigated how trip costs were paid, including the payment of fuel, bait, ice, food, catch handling, at-sea processing/boxing/packaging, and other trip-level expenditures, except the cost of leasing in quota/Days at Sea (DAS). When asked how trip expenses were paid between the boat owner and crew/hired captain, 73.3% (n=230) of respondents stated that the owner paid 100% of trip costs, while only 3.5% (n=11) stated that the crew paid 100% of these costs (Table 14). Trip costs were shared between vessel owners and crew/hired captains for 21.3% of respondents and the remaining 1.9% chose “other” to describe their trip payment system which typically related to having different payment systems based on types of trips taken. Of those that shared their trip costs and provided a percentage of the split (n=66), almost half (45.5%) stated costs were split fifty-fifty between owner and crew/hired captains (Table 15). Of the remaining 36 respondents with shared costs, 27.3% (n=18) reported that boat owners paid below 50% and 27.3% (n=18) reported that boat owners paid above 50% of trip costs. Lastly, when asked when trip costs are deducted from revenues, 80.3% (n=248) reported that costs are deducted “Off the Top” while 15.9% (n=49) reported costs are deducted after revenues are split between the owner and crew/hired captains (Table 16). The remaining 3.9% (n=12) selected “other” to describe how costs are deducted, and the majority of described methods varied depending on the expenses and price of product, the pace of fishing, and/or the type of fishing trips.

Table 14. Trip cost shares

Trip Cost Shares	Responses (n)	Percent (%)
Crew	11	3.5
Owner	230	73.3
Shared	67	21.3
Other	6	1.9
Total	314	100

Table 15. Percent of trip costs paid by owner

Trip Cost Owner Percent Paid	Responses (n)	Percent (%)
50	30	45.5
< 50	18	27.3
> 50	18	27.3
Total	66	100

Table 16. Trip cost payment systems

Trip Cost Payment Systems	Responses (n)	Percent (%)
After Split	49	15.9
Off Top	248	80.3
Other	12	3.9
Total	309	100

F. Captain and Crew Status and Payment Systems

A total of 65 (21.2%) respondents stated that they did not have a crew or a hired captain present for any of their trips in 2022. There were 244 individuals who responded to Question 8 which asked who served as the captain for the majority of commercial trips taken in 2022. Of those that replied, 84.8% (n=207) stated that they were mostly owner-operated while only 13.9% (n=34) mostly had a hired captain (Table 17). There were 3 (1.2%) respondents that stated trips were evenly split between hired captain and owner operator. Question 9 queries the system used to pay crew in 2022, including a share system, flat rate, or a combination of the two. Here, a flat rate system refers to payments made per unit time (for example, \$/hour, \$/trip, etc.) and a share system refers to revenues split between the boat and crew based on a percentage (for example, crew share and boat share as a percentage of total revenue). In terms of how crew are paid, the majority

(74.6%, n=182) used a share system, 10.3% (n=25) used a flat rate system and 12.3% reported using a combination of both a flat rate and share system (Table 18). Lastly, 7 individuals selected “other” when referring to how they pay their crew.

There were 33 individuals who selected that they provided benefits to crew members which is 9% of all respondents who answered at least one cost question. Benefits include: retirement benefits; health, life, or disability insurance; unemployment insurance; bonuses; profit sharing; and fringe benefits that apply to crew and hired captains. The average benefits provided to crew in 2022 was \$7,903.3, with a standard deviation of \$13,076.9 and a median of \$2,300, suggesting a wide range of benefit values provided across the fleet (Table 19).

Table 17. Captain status

Captain Status	Responses (n)	Percent (%)
Mostly hired captain	34	13.9
Mostly owner-operated	207	84.8
Evenly split	3	1.2
Total	244	100

Table 18. Crew payment system

Crew Payment System	Responses (n)	Percent (%)
Flat rate	25	10.3
Share	182	74.6
Combination	30	12.3
Other	7	2.9
Total	244	100

Table 19. Crew benefits

Variable	Responses (n)	Mean (\$)	Median (\$)	Standard Deviation (\$)
Crew Benefits Value	33	7,903.3	2,300	13,076.9

G. Permit and Vessel Value

There were 259 (75.7%) participants who stated that they knew the value of their vessel, including all onboard equipment and fishing gear, when asked the estimated market value of their vessel as of December 31, 2022, excluding fishing permits or fishing history of the vessel (Question 15). There were 58 (17.0%) respondents who stated they did not know and 7.3% stated they preferred not to answer (Table 20). The average market value was \$381,253.3 across the 259 participants who stated they knew the vessel value, with a standard deviation of \$812,858 and a median value of \$200,000 (Table 21). Similarly, Question 16 asked for the estimated market value of fishing permits associated with the selected vessel as of December 31st 2022, for which 341 participants provided an answer. There were 188 (55.1%) participants who stated they knew the value of their permits but a larger proportion who said they did not know (37.8%, n=129) or preferred not to answer (Table 22). Additionally, though 188 stated they knew the worth of their permits, only 176 individuals provided an actual value which averaged to \$294,129.8 with a large standard deviation of \$845,495.3 and a median of \$50,000 demonstrating a more skewed distribution relative to that of vessel value (Table 23).

Table 20. Vessel value known

Known Vessel Value	Responses (n)	Percent (%)
I don't know	58	17
Prefer not to answer	25	7.3
Yes	259	75.7
Total	342	100

Table 21. Vessel value

Variable	Responses (n)	Mean (\$)	Median (\$)	Standard Deviation (\$)
Vessel Value	259	381,253.3	200,000	812,858

Table 22. Permit value known

Known Permit Value	Responses (n)	Percent (%)
I don't know	129	37.8
Prefer not to answer	24	7
Yes	188	55.1
Total	341	100

Table 23. Permit value

Variable	Responses (n)	Mean (\$)	Median (\$)	Standard Deviation (\$)
Permit Value	176	294,129.8	50,000	845,495.3

H. Quota Leasing and Monitoring

On the majority of survey versions, vessel owners were asked about quota leasing costs and revenues (Question 17 & 19). Question 17 asked for individuals to record their total cost from leasing in quota or days at sea (DAS) in 2022 from permits associated with their selected vessel. Question 19 asked for the gross revenues earned from leasing out quota or DAS in 2022. Question 20 also asked for total quota monitoring costs (for which they were not directly compensated or reimbursed). There were 18 individuals who reported positive costs and revenues for this question, with the average cost of \$40,057, with a median of \$38,000 and standard deviation of \$34,385 (Table 24). The average revenue earned from leasing quota was \$110,821 with a median value of \$11,500 and standard deviation of \$341,356. The average cost for quota monitoring was \$3,134

(n=24), with a median of \$1,664 and a standard deviation of \$3,292. When asked how quota costs were paid (Question 18) over half of the individuals stated that costs were shared amongst the vessel owner and crew/hired captain while the remaining 26.3% (n=6) stated that they were completely paid by the vessel owner (Table 25). Of those that stated that quota payment costs were shared, 72.7% (n=8) stated that they were split fifty-fifty between the owner and crew/hired captain and the remaining 27.3% (n=3) reported the owner paid over 50% (Table 26).

Table 24. Quota payments, leasing revenue, and monitoring costs

Variable	Responses (n)	Mean (\$)	Median (\$)	Standard Deviation (\$)
Quota DAS Payments	18	40,057	38,000	34,385
Leasing Quota Revenue	18	110,821	11,500	341,356
Quota monitoring costs	24	3,134	1,664	3,292

Table 25. Quota payment system

Quota Payment System	Responses (n)	Percent (%)
Owner	6	26.3
Shared	12	63.2
Total	18	100

Table 26. Quota payment system boat percent

Quota Payment System Boat Percent	Responses (n)	Percent (%)
50	8	72.7
> 50	3	27.3
Total	11	100

I. Fleet Specific Costs and Source

There were some questions in previous survey versions prompting for fleet-specific costs including trailer launch fees, Individual Fishing Quota (IFQ) recovery fees, paralytic shellfish testing, seine skiffs, and spotter plane costs, which were asked in an effort to gather comprehensive cost information for each vessel. There were 28 individuals who reported a trailer fee value which averaged \$501.9 with a standard deviation of \$536.1 and median of \$355 (Table 27). IFQ recovery costs were reported by 5 individuals, averaging \$624.2 and a median of \$500 (standard deviation of \$477.8). Paralytic testing received no responses during this implementation. Three or less individuals recorded a cost for a new/replacement, repair/maintenance or upgrade to a seine skiff which averaged \$619 with a standard deviation of

\$355 and a median of \$499. Three or less individuals reported a spotter plane cost which averaged \$10,120 with a standard deviation of \$9,786.4. Lastly, 321 individuals answered Question 22 pertaining to what data sources were used when answering this survey, where 16.5% (n=53) stated they used their records, 36.8% (n=118) stated they used their best estimate and 46.7% (n=150) stated they used a combination of both records and estimates (Table 28).

Table 27. Fleet specific costs

Variable	Responses (n)	Mean (\$)	Median (\$)	Standard Deviation (\$)
Spotter plane cost	3*	10,120	10,120	9,786.4
Trailer launch fees	28	501.9	355	536.1
IFQ recovery cost	5	624.2	500	477.8
Seine skiff (RMUI)	3*	619.3	499	355.1

*n= 3 or lower

Table 28. Cost information source

Source of Cost Information	Responses (n)	Percent (%)
Records	53	16.5
Estimates	118	36.8
Both	150	46.7
Total	321	100

J. Non-Response Postcard

At the conclusion of the survey implementation period, a non-response postcard (NRPC) was determined a worthy addition to the data collection effort (Appendix Figure 7). This is the first time a non-response postcard has been used in the cost survey to understand individuals' reasoning for not participating in filling the questionnaire. The NRPC sample consisted of 1,696 individuals who did not participate in the survey²⁶. The non-response postcard asked why the individual did not respond to the survey and gave the following options, of which, an individual could check all that applied: “I don't trust NOAA/NMFS”, “The survey is too long”, “The survey is too complicated”, “I did not have my 2022 financial information available”, “I would have to pay my accountant to fill it”, “I was too busy”, “I was unaware of this survey”, “I was ineligible to take the survey”, “There was no monetary incentive offered to complete the survey”, “Someone else

²⁶ The NRPC sample of 1,696 records does not equal that of the final number of non-responders (1,947) in this report because the definition of “ineligibles” was redefined after the non-response postcards were sent (e.g., individuals that did not take trips in 2022 were still eligible to participate in the survey but were excluded from the NRPC sampling frame). Individuals who indicated a refusal to participate in the survey were also not sent a non-response postcard.

handles the finances so I am not the right person”, “I did not want to” and “Other.” The postcards were cleared by the CSWG’s contacts regarding Paperwork Reduction Act requirements. The NRPC was also sent to ICF’s survey methodologists for review. There were five iterations of the NRPC generated, randomizing the checkbox options to decrease anchoring behavior. The postcard was sent in an envelope and the card itself was a business reply such that postage was prepaid.

There were 272 postcards returned (16% response rate). Of those, the leading response was “I don’t trust NOAA/NMFS” with 117 (43.0%) of individuals choosing this response. This was followed by “I was too busy” (27.6%, n=75), “Other” (23.9%, n=65) and “I did not want to” (20.2%, n=55) (Figure 3). The options “The survey is too long” and “The survey is too complicated” received 52 (19.1%) and 50 (18.4%) responses, respectively. Barriers such as paying an accountant (11.4%, n=31) or not having 2022 tax information (10.3%, n=28) received a relatively low, but non-negligible, number of responses. Indicators suggesting there may be an issue with the survey sampling frame, including “I was unaware of the survey”, “I was ineligible to take the survey” or “Someone else handles the finances,” all received the lowest number of responses with only 13, 9, and 14 responses, respectively (4.8%, 3.3% and 5.2%). Lastly, 25 individuals (9.2%) indicated that no monetary incentive was provided to participate. Of those that responded “Other,” 50 individuals provided written explanations (as requested on the postcard). Of the written explanations, many (36%, n=18) either did not fish, were retired, or only fished part time/recreationally.

There were 11 explanations which (22%) expressed dissatisfaction with NOAA either in general, stating “NOAA does not care” or due to wind and whale-related regulations. An additional 10 individuals (20%) stated they did not remember receiving the survey or had other logistical challenges/confusion around whether their participation was warranted. Six individuals (12%) said providing this information was personal and/or none of NOAA’s business, and others (10%, n=5) stated that the survey was voluntary or that there were too many surveys going around at the moment, so they did not respond. Overall, these results can help researchers identify new pathways for increasing response to a voluntary survey.

Incentives could also play a role in increasing participation, though this option is currently not favored by the Office of Management and Budget (OMB) who approves the Paperwork Reduction Act (PRA) submission package for this survey effort. The theme of distrust is the most common and it is a challenging one to address, and could cause mandatory data collection and incentives to fail. Partnering with academics and industry leaders could help ease this challenge in the near term. In the long-term, the NEFSC, and the CSWG should consider these perceptions and better understand their roots to help build trust with the fishing industry. In addition, the CSWG is conducting more thorough research on comments left on the non-response post card (Conley et al. 2026a in press) as well as those provided on all cost surveys over time (Conley et al. 2026b) to better understand the trust issues that exist between vessel owners and NOAA Fisheries and identify pathways forward.

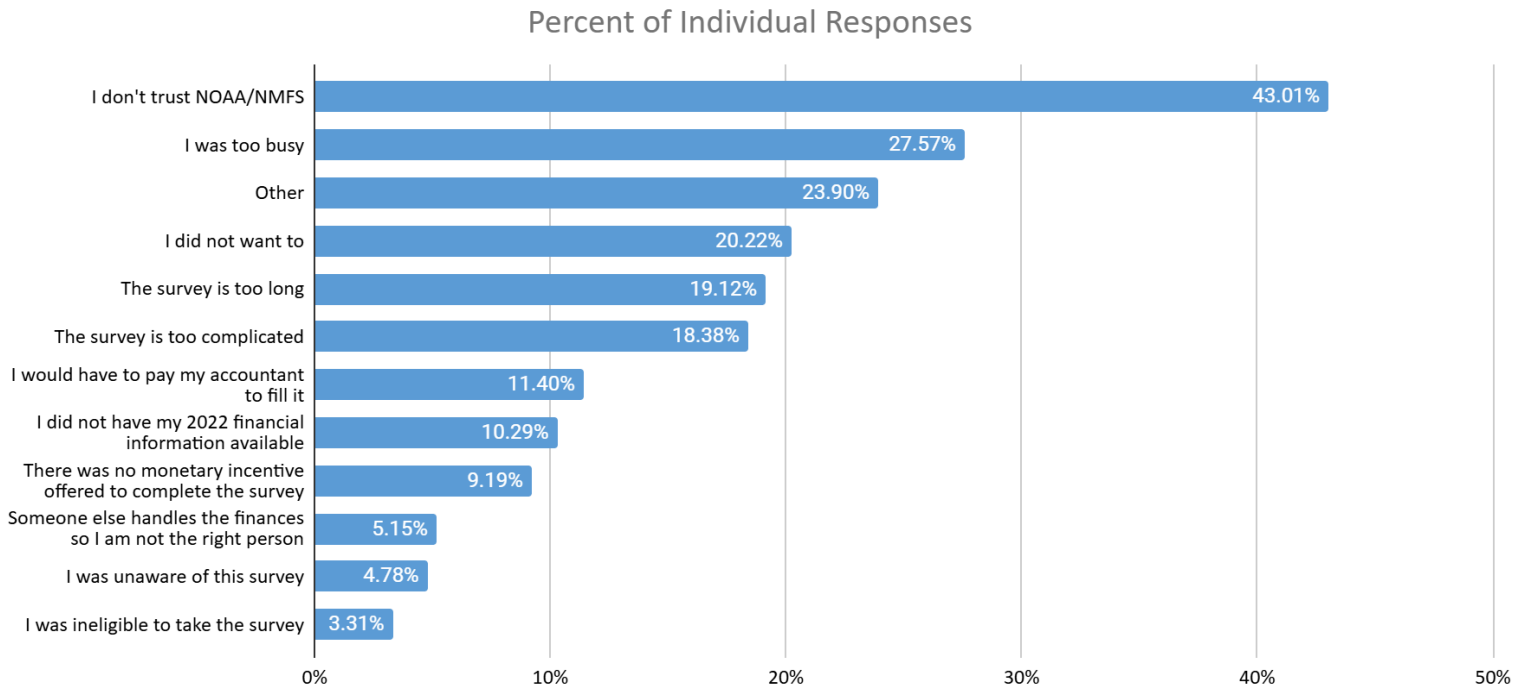


Figure 3. Summary of non-response postcard responses

VI. SUMMARY AND FUTURE RECOMMENDATIONS

This document highlights the 2022 cost survey effort with an emphasis on the implementation process, cost data cleaning protocol and results of the survey not provided on other platforms. It is recommended that the data cleaning protocol be utilized in future survey implementations. Code for this effort has been developed and stored on GitHub²⁷. This cleaning protocol will help increase the quality of the data and improve analyses generated by end users. The implementation of the cleaning practices outlined in this document are paramount for producing the best available science and ensuring data summaries are utilizing high quality cost data. Ultimately, the CSWG views this survey implementation as successful, with a carefully implemented survey, average level of response with indication of low bias, and particular emphasis on providing deliverables using 2022 data in a timely fashion. There are a number of areas to consider for future implementation. First, ensuring that outlier analyses consider the skewness of the data and potentially use IQR methods. The questions within the survey should be reviewed and compared to findings from the NMFS cost and earnings working group technical memorandum suggesting question formatting best practices (forthcoming). Deletion of questions that are not contributing to the main goal of calculating net-returns should be considered. Representativeness work should continue to bolster the confidence in applying these data to the larger population and additional work can stem from this to potentially decrease sampling sizes of certain populations (e.g., pot/trap vessels) to ease survey burden while maintaining a representative sample. Additionally, conveying that the survey

²⁷ Code can be made available upon request contingent on data confidentiality restrictions.

takes 30 minutes rather than 60 minutes to complete may also be a useful strategy for soliciting responses. The non-response postcard highlights low survey participation to be driven by distrust with NOAA rather than implementation logistics and will continue to pose a challenge for researchers if not rectified. The time it takes for SSB staff to administer the survey as well as the protocol is also something to consider. While the CSWG focused on reproducibility of the protocol, visual assessments and discussion of histograms are time consuming and therefore costly. Additional efforts to allocate contract staff time to lead the QA/QC protocol may be of interest for the future. This manuscript, along with additional cost databasing efforts and research publications, are key in ensuring that cost data and results are more widely used to inform management and that this data stream is accessible and utilized to its maximum potential.²⁸ In closing, the CSWG has successfully secured additional funds to increase efficiencies with implementation and data storage/access. As costs are a key factor in understanding net-returns (e.g., profit), the SSB should continue to prioritize the collection, cleaning and utilization of the cost and earning information from the federal commercial fishing fleets in the Northeast region.

²⁸ The 2019 focus group participants stated some do not respond to the survey because they believe the data are not used. This has led the CSWG to allocate additional resources to data cleaning, databasing and generating novel research projects and publicly-available tools using cost survey data to maximize data usage. The team also has longer term plans to create cost models and create frameworks for incorporating cost data into management in the future.

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VIII. APPENDIX



NOAA
FISHERIES

National Marine Fisheries Service
Northeast Fisheries Science Center

January 17, 2023

Dear Business Owner,

The Northeast Fisheries Science Center (NEFSC) is conducting a survey to collect commercial fishing business costs from vessel owners in the Greater Atlantic region.

This is a voluntary survey effort that will help us improve the region's economic data. These data are needed to analyze the impacts of various alternatives in Fishery Management Plan frameworks and amendments. Without this information, economists are limited in their ability to inform management decisions or fully evaluate economic impacts.

This is the only NOAA Fisheries effort collecting this type of cost information in our region.

You are receiving these bundled survey notifications because this address was listed on the federal permit application for multiple vessel owners who we are asking to participate in the survey.

We are asking for your help in delivering these notifications to the correct vessel owners and encouraging them to participate in this important data collection event.

If you have any questions regarding this letter, the survey, or the survey questions, please call: 508-495-2015.

We thank you for your consideration and your help in our effort to improve the cost information used to inform management decisions.

Thank you,

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Northeast Fisheries Science Center

• 166 Water Street Woods Hole

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Appendix Figure 1. 2022 cost survey prenote



**NOAA
FISHERIES**

National Marine
Fisheries Service
Northeast Fisheries
Science Center

GREATER ATLANTIC REGION COMMERCIAL FISHING BUSINESS COST SURVEY FOR 2022

Multiple Gears

WHY PARTICIPATE?

We use the information for socioeconomic analyses that inform management decisions

OMB control number: 0648-0773
Expires 4/30/2025

YOUR INPUT IS IMPORTANT TO US

Your individual responses and participation will be kept confidential

Appendix Figure 2. 2022 multi-gear cost survey

Individual participation and responses will be kept confidential.

Throughout the survey we will refer to a "selected vessel", that you own.

Please respond to these questions thinking only about this vessel:

[Vessel Name]

Coast Guard Documentation or State Registration Number [12345678]

General Information

1. In what year did you become the owner of the selected vessel? Please see the top of this page for the name of the "selected vessel".

YYYY

2. How many commercial fishing/shellfishing trips did the selected vessel take in 2022? Please write the number of trips in the box below.

Commercial trips

- ☐ This vessel was inactive for all of 2022
- ☐ This vessel **did not** take any commercial fishing/shellfishing trips in 2022, but did take recreational or other types of trips

New/Replacement, Repair/Maintenance, Upgrade and Other Costs for the Selected Vessel

3. Record your total new/replacement, repair/maintenance, and upgrade costs incurred in 2022 for the selected vessel. In this section, please **do include the associated labor costs** (paid out to vendors).

New, Repair, Maintenance, & Upgrade Cost Category	Total 2022 Cost for the Selected Vessel	OR	Check Box if NO Cost in 2022
Propulsion Engine such as engine, drive train, exhaust/cooling systems and cost of oil/oil changes	\$.00		☐ No Cost
Deck Equipment / Other Machinery such as winches, haulers, generators, hydraulics, compressors, reels, pumps	\$.00		☐ No Cost
Haul-out Costs such as haul-out costs for regular repair and maintenance, emergency haul-out, long term storage, zincs, bottom paint, acid wash and gel coating	\$.00		☐ No Cost
Hull such as frame, deck, wheelhouse, keel, steering, rigging, fish holds, fuel tanks	\$.00		☐ No Cost
Fishing Gear such as codends, nets/panels, dredges, buoys, highfliers, doors, pots/traps, cables, tackle	\$.00		☐ No Cost
Wheelhouse Electronics such as radar, GPS, new/updated VMS system (not VMS fees), sounder, radio, depth/temp/net sensors, monitors (Do not include electronic monitoring [EM] costs in this section)	\$.00		☐ No Cost
Processing / Refrigeration such as refrigerated seawater systems, packaging equipment, ice maker (Do not include the cost of ice itself, shore-side freezer rental, or ANY costs captured in docking fees (Question 4))	\$.00		☐ No Cost
Safety Equipment such as EPIRB, raft repacking, fire extinguisher maintenance, flares, survival suits	\$.00		☐ No Cost

4. Record the **amount spent in 2022 for the selected vessel** for **each** of the categories below.

Category	Total 2022 Cost for the Selected Vessel	OR	Check Box if NO Cost in 2022
Mooring/Docking Fees including upkeep expenses you paid in 2022	\$.00		☐ No Cost
State and Federal Permits and/or License Renewal Fees <i>not including</i> costs pertaining to purchasing permits or licenses	\$.00		☐ No Cost
Vessel or Permit Payments/Financing including the amount you paid on down payments or loans on vessel/permit purchases, made in 2022, including tax	\$.00		☐ No Cost
Annual Vessel Insurance Premium for 2022 annual premium paid for hull and Protection & Indemnity (P & I) insurance in 2022	\$.00 Number of months insured: Number of months vessel was laid-up/out of water in 2022:		☐ No Cost

Trip Expenses for the Selected Vessel

Note: If this vessel **did not take any commercial trips in 2022**, check here ☐ and **SKIP** to Question 12.

5. Please provide your **total trip costs** by category **OR** the **average cost per trip** (best estimate) if that amount is easier to provide, for the selected vessel incurred in 2022.

Do not include costs if they were captured in mooring/docking fees (Question 4).

Trip Cost Category	Total 2022 Cost for the Selected Vessel	OR	2022 Avg. Cost per Trip	OR	Check Box if NO Cost in 2022
Fuel	\$.00		\$.00		☐ No Cost
Bait including shore-side baiting labor costs if applicable	\$.00		\$.00		☐ No Cost
Food for captain and crew	\$.00		\$.00		☐ No Cost
Ice including purchases or cost of making ice	\$.00		\$.00		☐ No Cost
Catch Handling costs for auction, lumping, grading, shipping/trucking, and unloading. <i>Please only include costs directly incurred by the vessel. Do not include costs that were captured in ex-vessel prices.</i>	\$.00		\$.00		☐ No Cost
At-sea Processing, At-sea Boxing/Packaging	\$.00		\$.00		☐ No Cost

6. Please choose the option that best describes how trip expenses were paid for on most commercial trips in 2022:

Please do not include the cost of leasing in/buying quota or Days at Sea (DAS). A full list of trip expenses to consider can be found on the survey instruction sheet.

- ☐ 100% of trip expenses were **paid by the boat/owner** (including cases of no crew or hired captain in 2022)
- ☐ 100% of trip expenses were **paid by crew**
- ☐ Trip expenses were **shared**: Boat/owner paid % of trip expenses
- ☐ Other (*please describe*):

7. Trip expenses in 2022 were paid...

- ☐ Off the top (including cases of no crew or hired captain in 2022)
- ☐ After shares were split
- ☐ Other (*please describe*):

Crew Payment System for the Selected Vessel

Note: if this vessel **did not have crew AND did not have a hired captain** onboard for any commercial trips in 2022 please check here ☐ and **SKIP** to Question 12.

8. Who was the captain of this vessel for the majority of commercial trips taken in 2022?

- ☐ Majority hired captain
- ☐ Majority owner-operated
- ☐ Commercial trips were evenly split between hired captain and owner-operated
- ☐ The selected vessel did not take any commercial trips in 2022 (**SKIP** to Question 12)

9. Which **crew payment method was used on the majority of commercial trips on the selected vessel in 2022?**

- ☐ A flat rate system (\$/hour, \$/day, \$/week etc.)
- ☐ A share system
- ☐ A combination of a flat rate system AND a share system
- ☐ Other (*please describe*):

10. What were the **total** payments (excluding bonuses) made to **crew and hired captains** in 2022?

Please check No Cost where applicable.

a. Crew: \$.00 OR ☐ No Cost

b. Hired Captain: \$.00 OR ☐ No Cost

11. If you (the vessel owner) provided any **benefits to the crew and/or hired captains that worked on the selected vessel in 2022**, what was the **total cost for these benefits in 2022**? Please include holiday bonuses and profit sharing (see the instruction sheet for a full list of benefits).

\$.00 OR ☐ I did not provide benefits to crew or a hired captain in 2022.

Overhead Costs

12. Please record **all overhead costs associated with this vessel only** that were incurred in 2022.

If you own **multiple vessels and you are not able to provide overhead costs associated with the selected vessel**, please report the total overhead costs for your fishing business in the "Total Cost for All OWNED Vessels" column.

Category and Examples	Total 2022 Cost for the Selected Vessel	OR	Total Cost for All OWNED Vessels	OR	Check Box if NO Cost in 2022
Business Vehicle Costs including mileage/fuel, insurance, maintenance and financing apportioned to fishing business-related purposes only	\$.00		\$.00		☐ No Cost
Business Travel Costs including lodging and travel expenses for business-related activities, excluding business vehicle costs and trucking/shipping costs	\$.00		\$.00		☐ No Cost
Association Fees Paid including co-operative, fishing organization, sector fees, and union dues	\$.00		\$.00		☐ No Cost
Legal Expenses Paid including settlement and legal fees	\$.00		\$.00		☐ No Cost
Additional Labor Payments including payments to accountants, office administrative assistants, bookkeepers, and night watchmen	\$.00		\$.00		☐ No Cost
Advertising Costs	\$.00		\$.00		☐ No Cost
Communications Costs including cell/landline phones, office radio, VMS operational fees (not including the cost of new/upgraded VMS systems) etc.	\$.00		\$.00		☐ No Cost
Office/Workshop/Storage Expenses including office/workshop supplies, office utilities (electric, heat, internet, etc.), rental of office/shed/freezer space, excluding communication costs	\$.00		\$.00		☐ No Cost

13. For how many permitted vessels were you listed as an owner of in 2022 (not including skiffs)?

Owner of vessels

14. How many of the vessels in Question 13 took at least one commercial fishing/shellfishing trip in 2022?

vessels

The Value of the Selected Vessel

15. As of December 31, 2022 what was the **estimated market value of this vessel?** Please include all equipment and fishing gear. Please **do not include fishing permits or fishing history in this value.**

\$.00

☐ I don't know

☐ I prefer not to answer

16. As of December 31, 2022 what was the **estimated market value of the fishing permits and fishing history associated with the selected vessel?**

\$.00

☐ I don't know

☐ I prefer not to answer

Quota Costs and Revenues for the Selected Vessel

NOTE: If you **DID NOT lease IN or lease OUT quota and had no Research Set-Aside (RSA) costs in 2022** please check here ☐ and **SKIP to Question 20**. Please **do not** include permanent quota transfers in this section.

17. Record the **total cost** from **leasing IN quota** or DAS in 2022 from permits associated with the selected vessel. If non-monetary payments were used to obtain quota or DAS, please estimate the value of those non-monetary payments. Include the cost of purchasing Research Set-Aside quota or DAS.

\$.00

☐ No cost in 2022 from leasing IN quota or DAS from permits associated with the selected vessel (If no costs, please **SKIP** to Question 19).

If quota leasing costs cannot be attributed solely to the **selected vessel**, because costs were **associated with multiple vessels**, list the total quota cost below and the number of vessels the cost pertained to:

\$.00 total quota costs across number of vessels.

18. If you incurred a cost in Question 17, how were these costs paid in 2022?

- ☐ 100% of quota leasing costs were **paid by the boat/owner** (including cases of no crew or hired captain in 2022)
- ☐ 100% of quota leasing costs were **paid by crew**
- ☐ Quota leasing costs were **shared**: Boat/owner paid % of quota leasing costs
- ☐ Other (please describe):

19. Record your **gross revenues** earned from **leasing OUT quota** or DAS in 2022 from permits associated with the selected vessel.

\$.00

- ☐ No revenue received in 2022 from leasing OUT quota or DAS from permits associated with the selected vessel.

20. Record total quota monitoring costs (for example, costs from observer or dockside monitoring/electronic monitoring equipment/servicing/video review) incurred in 2022 for the selected vessel. *Please only include costs that you were not directly compensated or reimbursed for.*

\$.00

- ☐ No quota monitoring costs incurred by the selected vessel in 2022 (including if all quota monitoring costs were reimbursed).

Completeness of Cost Information

21. Did you have any other costs in 2022 for the selected vessel that we have not asked about in this survey? If so, list them below. *Please **do not** report your personal costs (see instruction sheet for examples of personal costs).*

Additional Cost in 2022	Description of Other Costs Incurred in 2022 for the Selected Vessel
\$.00	
\$.00	

22. Please indicate if the costs provided in this survey were directly from your records or from your best estimates.

- ☐ Cost information provided is from my records.
- ☐ Cost information provided reflects my best estimates.
- ☐ Cost information provided reflects both information from my records and some best estimates.

Survey Follow-up Questions

23. May we contact you if we have follow-up questions to clarify the information you have provided us within this survey?

- ☐ Yes
☐ No

24. If you responded "YES" to Question 23, please provide your contact information and preferred method for contacting you:

Name

Telephone

Email

Preferred method
of contact

- ☐ Telephone
☐ Email

THANK YOU FOR YOUR TIME!

Please use the space below to write comments or suggestions.

Greater Atlantic Region Commercial Fishing Business Cost Survey FAQs

Who is conducting this survey?

- This survey is being conducted by a team of economists within the Social Sciences Branch (SSB) of the Northeast Fisheries Science Center (NEFSC) in Woods Hole, MA.

Why are these data being collected?

- The cost data can help economists at the Social Sciences Branch analyze the impacts of various alternatives in Fishery Management Plan frameworks and amendments, and to better capture the economic performance of regional fisheries over time.

What data are being collected?

- Costs being collected include vessel repair/maintenance & upgrade/improvement costs, vessel permit fees, mooring fees, insurance costs, overhead costs, quota leasing, and total payments to crew and hired captains.
- At-sea observers collect some trip cost information, such as fuel, bait and ice; however, there are many additional commercial fishing costs not collected by observers which we collect using this survey.

How can filling out this survey benefit the fishing industry?

- Cost information provided by survey participants allows analysts to track trends in costs over time and understand the economic performance of fishing fleets. These costs are ultimately used to inform management decisions.
- Aggregated data summaries can also be used by fishermen for business planning purposes (see the back of this sheet for information on the SSB's cost data visualization tool).

Who are we asking to take this survey?

- We are asking all owners of federally permitted commercial fishing vessels in the Greater Atlantic region to fill out a survey. If an individual owns multiple commercial vessels, they will be asked to complete a single survey for only one of their vessels. Surveys will be customized by gear type based on vessel fishing activity during 2022.

How can I be updated on the data that are being collected?

- Data summaries will be available at the following website: (<https://apps-nefsc.fisheries.noaa.gov/socialsci/cost-data>), which currently contains results from previous SSB cost surveys.

What about confidentiality?

- Your participation and responses to this survey are completely confidential. All data appearing on the website and in reports will be presented in a manner that protects confidentiality. Raw data can only be accessed by NOAA fisheries staff and affiliates with signed non-disclosure agreements.

Questions? Please contact Social Sciences Branch staff economists [Samantha Werner](#) (508) 495-4733, Samantha.Werner@noaa.gov or [Greg Ardini](#) (508) 495-4710, Gregory.Ardini@noaa.gov

Appendix Figure 3. 2022 cost survey FAQ sheet

Instruction Sheet for the Greater Atlantic Region Commercial Fishing Cost Survey for 2022

For All Questions

- **DO** refer to **calendar year 2022**. All references to “*the year*” refer to calendar year 2022.

For Questions About Costs

- **DO** consult your records;
 - ▶ **Use your Schedule C (Form 1040, 1099, or corporate tax return form) of your 2022 federal tax return** pertaining to calendar year 2022.
 - ▶ If you cannot find the information in your records or cannot consult your records, please use your **best estimates of the costs** you incurred.
- **DO** remember to check the “No Cost” option if you incurred \$0.00 (no cost) for a cost category in 2022 unless prompted to skip.

For Questions About Costs for the Selected Vessel (where the “Selected Vessel” is identified on the first page of the survey)

- **DO** report combined costs for all state and federal fishing activity, including Research Set-Aside (RSA) trips.
- **DO** report costs or indicate “no cost” even if the vessel did not take any trips in 2022 unless prompted to **SKIP**.

NOTE: There may be questions that do not pertain to you. In these cases, please **SKIP** those questions as instructed.

If You Are Not the Best Person to Answer Questions About Commercial Fishing Costs

- **DO** send the survey to the person that is the best equipped to answer cost-related questions.
- **DO** answer questions from the owner’s perspective when asked about the number of vessels owned etc.

Flip to the back for detailed instructions for individual survey questions.

Thank you for taking the survey

If you have any questions pertaining to any part of the survey
do not hesitate to call 1-508-495-2015

Personally identifiable information will be kept confidential. Information collected **will not be** used for tax purposes.

Specific Question Directions and Examples

Question 3

Example of an upgrade: investing in (purchasing) a more advanced GPS system. Example of maintenance or repair: Repairing a GPS unit you own because it was damaged.

Question 5

This question refers to a subset of the trip (operating) costs which were identified as the most significant on fishing trips. Any costs you feel were missed can be captured at the end of the survey in Question 21.

Question 6

This question refers to how trip costs are paid for, not including the cost of leasing in quota/Days at Sea (DAS). Trip costs include the cost of fuel, bait, ice, water, supplies, groceries, oil, and other trip-level expenditures.

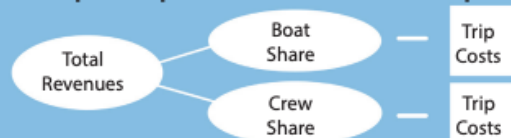
Question 7

Please refer to the schematic for how trip costs were subtracted from pay

Example A: Trip Costs Subtracted "Off the Top"



Example B: Trip Costs Subtracted "After the Split"



Question 9

Here, a flat rate system refers to payments made per unit time (for example, \$/hour, \$/trip, etc.). A share system refers to revenues split between the boat and crew based on a percentage (for example, crew share and boat share as a percentage of total revenue).

Question 11

Benefits include: retirement benefits; health, life, or disability insurance; unemployment insurance; bonuses; profit sharing; and fringe benefits. Only include benefit expenses for crew and hired captains.

Question 12

Overhead costs refer to costs that generally do not vary by the number of trips taken. Please provide the overhead cost attributed to the selected vessel **ONLY**. If you are unsure or unable to provide the cost associated with the selected vessel, please go to the "Total Cost for All OWNED Vessels" column and write the total overhead cost for all owned vessels.

Question 13

On how many permitted vessels (state or federal) were you listed as an owner in 2022 to which your overhead costs from Question 12 apply?

Questions 15-20

These questions include longer directions in the survey to clarify what information to provide. If you need assistance on how to answer these questions, please call: 1-508-495-2015.

Question 21

Personal costs refer to costs not directly related to fishing business activities associated with the selected vessel. For example, do not include driving a personal vehicle to and from the docks or home insurance in this section.

Appendix Figure 4. 2022 cost survey instruction sheet

Paperwork Reduction Act Statement

The Northeast Fisheries Science Center (NEFSC) is collecting this economic information to improve its ability to conduct analyses required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and other applicable law. The NEFSC, the New England Fishery Management Council, and the Mid-Atlantic Fishery Management Council will use this information to monitor, explain and predict changes in the economic performance and impacts of regional fisheries. Among other things, this will enable fisheries managers and the public to more fully consider the economic effects of proposed and existing regulations for regional fisheries. A Federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with an information collection subject to the requirements of the Paperwork Reduction Act of 1995 unless the information collection has a currently valid OMB Control Number. The approved OMB Control Number for this information collection is 0648-0773 and its expiration date is 4/30/2025. Without this approval, we could not conduct this information collection. Public reporting for this information collection is estimated to be approximately one hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the information collection. All responses to this information collection are voluntary. Send comments regarding this burden estimate or any other suggestions for reducing this burden to Gregory Ardini, NMFS NEFSC, 166 Water Street MB19, Woods Hole, MA 02543, Gregory.Ardini@noaa.gov.

Confidentiality Statement

We appreciate the confidential nature of the data being collected by this survey. The NEFSC will handle individual survey data as confidential business information and a form of protected personal information and will maintain the confidentiality of the information consistent with legal authorities available to it, including but not limited to the Privacy Act (5 U.S.C. Section 552a) and the Trade Secrets Act (18 U.S.C. Section 1905). The NEFSC will protect individual survey data from public disclosure to the extent permitted by law and it has instituted procedures to provide that protection.

Appendix Figure 5. 2022 cost survey PRA and confidentiality statement



NOAA
FISHERIES

National Marine Fisheries Service
Northeast Fisheries Science Center

September 14, 2023

Dear _____,

As this data collection comes to a close, we wanted to offer our sincere thanks for your participation in the Greater Atlantic Region Commercial Fishing Business Cost Survey for 2022. Your responses have been received and are being processed. Your time and effort has helped increase the survey's response rate, which is significantly higher than the last time this survey was fielded in 2016.

The data will be used to better inform the economic impacts of fishery management decisions. We are planning to incorporate the data in fishery management analyses later in 2023 and into the future.

Additionally, aggregate data from the 2022 survey will be added to our cost data visualization tool in the coming months. This tool, released in December 2022, allows for cost summaries to be queried by gear type and cost category. Cost distributions from this survey can also be compared to previous survey years, including cost data from 2011, 2012, and 2015. The cost data visualization tool can be accessed through the QR code to the right.



Thank you again for your participation. If you have any questions about the use of the data collected in this survey, please do not hesitate to call our survey hotline at 508-495-2015.

Sincerely,

Samantha Werner

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Gregory Ardini

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Northeast Fisheries Science Center

• 166 Water Street Woods Hole

• MA 02543-1026

Appendix Figure 6. 2022 cost survey thank you letter

Our records show you did not respond to the Greater Atlantic Region Commercial Fishing Business Cost Survey for 2022. We are reaching out to understand why. Please fill out the question below and place this card back in the mail, at no charge to you.

I did not respond to the survey because... *(please check all that apply)*:

- ☐ I don't trust NOAA/NMFS
- ☐ The survey is too long
- ☐ The survey is too complicated
- ☐ I did not have my 2022 financial information available
- ☐ I would have to pay my accountant to fill it
- ☐ I was too busy
- ☐ I was unaware of this survey
- ☐ I was ineligible to take the survey
- ☐ There was no monetary incentive offered to complete the survey
- ☐ Someone else handles the finances so I am not the right person
- ☐ I did not want to
- ☐ Other

Your participation is voluntary and individual responses are kept confidential.

Thank you,
Gregory Ardini, Elizabeth Conley, Samantha Werner
Northeast Fisheries Science Center Cost Survey Working Group

Appendix Figure 7. 2022 cost survey non-response postcard

Appendix Table 1. Pre-testing focus group summary

Target Question	Themes	Specific Examples
<i>Initial thoughts</i>	Survey burdens/issues	Too tedious
		Overwhelming, not easy
		Have to review records
		Too complex
		Too long
		Time consuming
	Survey suggestion	Provide different survey versions for different gear types
		Reduce redundancy
	Distrust with NOAA/fear/anger	Will the survey help us or be used against us?
		How is this going to help me as a fisherman
		Council has meetings at 9 in the morning, obviously don't care about fishermen
		Observers turned into enforcement
	Use of Data/Results	Council doesn't use the data
		Answers need to have an impact on regulation
		Biological data prioritized over economic
		Never see results
	Feelings about focus group	First time being contacted
		I feel like you are valuing our input and this is new to us
<i>Accountant use</i>	Mixed feelings	Survey is straight forward – I just use taxes
		I would have to pay accountants to complete it
		I would “ball park” the answer and that is good enough for the survey
<i>Survey outreach</i>	Thoughts	Require survey when filing for new permit
		Would rather attend a fisheries convention than SSB staff coming to home ports
		Use mass fishery forum, port meetings or booth to talk about the survey and what the data is used for
		Talk to people
		Create helpful tool

Target Question	Themes	Specific Examples
<i>Incentives to participate</i>		Consider monetary incentives
		Consider time of year
	Monetary	\$5 would be a slap in the face
		\$1000 would be nice
		Cash is king
		Not interested in a raffle for charity
	Information	Gaining an extra \$1000 a year from the survey results which provides information and impacts management
	Other	Make mandatory
		Hotline to call in to
		Tailored survey (by gear/fishery)
		Fishing advocacy group
		Describe why and how data is used
		Use alternative wording (avoid NOAA logo/language)
<i>Producing products useful for fishermen</i>	Thoughts	Different costs from similar vessel may not be helpful
		Helpful to present at council meetings
		Ports as a productive meeting spot
<i>Survey mode</i>	No preference	Online would make it shorter and easy to save
		Email is the best mode of communication
		Hate email and never use it
		Would rather fill it at the kitchen table with a personal interview
		Phones calls is best
	Personal interview	Could be helpful for confusing questions and to decrease feeling overwhelmed
		Ideally port agent to perform interview since a good relationship has been established
	Feelings towards sector managers receiving information on participants who were sent the survey	Would feel targeted
		Since the survey is voluntary it would not be fair
		Does not convey anonymity

Target Question	Themes	Specific Examples
	NOAA branding	Anything from NOAA goes in the trash
		Never open NOAA mail
	Other ideas	Would be willing to send their schedule C's/tax returns
		Higher monetary incentive payment
<i>Receiving results</i>	1 page summary	
	Fish eye	Like how it is interactive
		Like how it helped them
	Phone call	
	Port meetings (at a reasonable time)	
<i>Timing of survey implementation</i>	Thoughts	End of year
		January
		After April
		When lobster fishing is slow
		Not summer
		During tax time to make it easier
		Do not coincide with other survey efforts
		Does not matter
<i>Survey section: repair and maintenance</i>	Composite	Easier to do a "bottom line"
		Would be too difficult to go through all receipts so this way is easier
	Itemized	Would be easier to remember certain costs that may have been forgotten
		More accurate
<i>Survey section: crew payment</i>	Bubble	Not preferred
	Written	Easier
		Would help them focus
	Other	May differ for smaller v. larger vessels
		Modifications for how much comes off the top
		Flat rate is against the law

Target Question	Themes	Specific Examples
		Ports do not pay in same way
		Each fishery is different
<i>Survey section: market value of permits and vessels</i>	Inclusion	Easy to just write a number
		No one is thinking of replacement costs, only that someone is willing to pay
		Some are constantly using online websites to compare price of their vessel and permits
		Should have two separate values for permit and vessels
	Vessel value	Some said they know this value from marine surveyor's price guideline
	Permit value	Subjective and no price guideline
		Would "ball park" it
	Other	Would not be a make-or-break question
		Would skip question rather than throw the survey away
		Understood economic importance of question
<i>Survey section: operating costs</i>	Delete	Hard to fill on an annual basis
		Will shorten survey
		If they don't carry an observer, would give ball park answers
		Would not matter because costs come out of crew payments so makes answering the question more confusing
	Keep	Make optional

Appendix Table 2: QA/QC process summary

Assessment Type	Completed for	Goal	Methods	Outcome
<i>Aggregated cost category</i>	Major cost categories: New/Replacement, Repair/Maintenance, Upgrade/Improvements, Vessel Costs, Trip Expenses, Crew Payments, Overhead Costs	Identify outliers or data entry errors from major cost categories	Gear-based histograms created to visually identify possible errors Values greater than +5 SD from the median by gear type and aggregate cost category were identified as outliers	Outliers were either verified or corrected by contacting the survey participant or replaced with an aggregate cost average when no contact was made
<i>Sub-cost category</i>	All sub-cost categories to major cost categories	Identify outliers/data entry errors at the sub-cost level	Gear-based histograms created to visually identify possible errors Potential outliers were cross-checked against vessel characteristics and cost category distribution	Potential outliers were assessed on a case-by-case basis and the value was either kept or replaced with an average value by cost category and gear type
<i>Column switch</i>	Trip costs: participants were asked to either provide their total annual trip cost for the vessel in one column or their average cost for each trip in the next column Overhead costs: participants were asked to either provide their total annual overhead costs for the selected vessel in one column or their total annual costs across all owned vessels in the next column	Correct cases where values were placed in the wrong column when given a choice to provide an aggregate value or a unit value	Gear-based histograms created to visually identify possible errors Identified categories that showed costs off by an order of common magnitude Tally of top 3 values to track vessels with recurring higher costs Potential outliers were cross-checked against vessel characteristics and cost category distribution	Values were either kept in their original column, switched to the appropriate column, or were corrected (rounding up/down or replacing with an average based on gear type and cost category) If multiple sub-cost category questions indicated a systematic issue, with values that were within the range of the column in question (e.g., average fuel costs vs total annual fuel costs), all values in the question were changed to their correct column
<i>Non-cost and qualitative</i>	Questions that provided a space for a written response including "Other" answer choices (trip expenses payment methods, crew payment methods, quota cost payment methods, additional costs), comments section at the end of the survey	Correct cases where qualitative answers provided should be grouped in a survey question already provided	Written answers were reviewed and if the description provided clearly fit into one of the multiple-choice options provided, the written answer was grouped accordingly and deleted from the fill-in response Any cost description provided at the end of the survey in the comments section were compared to the appropriate survey questions to ensure costs were not being double-counted, then were appropriately categorized and deleted from the comments	Qualitative information on costs provided correctly grouped in appropriate survey categories
<i>Miscellaneous</i>	Any survey filled out using an incorrect vessel	Make sure multi-vessel owners filled the survey for the vessel in sampling frame	If vessel was not listed in sampling frame, investigated other vessels owned under survey taker's name	If a vessel owner filled out the survey for a different vessel that they owned, information pertaining to the vessel in the sampling frame and the response dataset were altered to

Assessment Type	Completed for	Goal	Methods	Outcome
				the vessel for which the survey was filled
	Ranges or essential cost valued at 0	Replace with usable value	In cases where the respondent reported a range of costs rather than a single value, the average was taken and used for analysis In cases where an essential operating cost (i.e., fuel) had a value of \$0, that value was replaced with the average trip-level cost for that category by gear type and multiplied by the total number of trips	Values replaced with average
	Trip numbers	Input most accurate value	If the number of trips provided was extreme (i.e., the magnitude appeared to be off by a factor of 10), the values were compared to the number of trips reported on Vessel Trip Reports for these individual vessels. If inconsistent information was provided regarding the number of trips a vessel took between Question 2 and Question 14, the record was altered to match the information provided in the first answer provided earlier in the survey (i.e., if Question 14 was left blank but Question 2 indicated commercial trips were taken, "1" was inputted for Question 14)	Consistent and accurate trip number recorded
	Keystroke errors	Thoroughly investigate full surveys for other potential errors	Entire survey was reviewed if a keystroke error was discovered to investigate other potential keystroke errors	No additional errors found
	Outlier follow-ups and value replacement	Confirm value with respondent	If column switches were ruled out or not applicable and the value was deemed likely an error after comparing to contextual vessel information and cost category distributions, there were protocols to either call the participant if they had checked off their willingness to be contacted with follow-up questions (question asked within the survey) or to replace the value with an average calculated by the gear type In the case where the average total annual costs were calculated and if a gear type did not have enough responses for that particular question, the average across all gear types was used. The calculation and replacement of values with averages was completed at the end of the protocol implementation and any value that was to be replaced was excluded from the calculation of the mean	Values were either confirmed and kept as is, or replaced with an average based on cost category and gear type

Appendix Table 3: Manual data entry protocol

Question number	Problem	Solution
All	If "0" was written in answer box	Checked "no cost" option
	Handwriting discrepancies	Compared number in question to other numbers written on survey
	Range provided	Average taken
	Additional information written about cost	Calculation done to include additional information
	Invalid answers given	Left answer blank
	Comments written on other areas of the survey aside from comments section	Added to comments section
	Additional cost given that should belong in a different section	Inputted as is and made a note of proper section to add these costs to the spreadsheet
	If a cost was given but "no cost" was also checked off	Inputted cost information provided and unchecked "no cost"
	If value given with comma but missing the correct amount of 0's	Inputted correct amount of zeros based on placement of comma (ex: wrote: 230,00 → inputted: 230,000)
	If online survey was already started and different answers were provided on hard copy	Inputted the answers provided on hard copy and noted the differences in Google Sheet
	If two costs given and separated by a "+"	Added two costs together and inputted total value
	Dash ("-") or "X" provided	Inputted as "no cost"
	Refusals (no cost info provided)	Clicked through to record comments at end
	If comments left under "other" indicated a better answer choice	Recorded information as written and made a note of suggested change in Google Sheet
	Wrong columns filled out	Verified the mistake using multiplication method and filled in correct columns
Question 2 (number of trips)	If marked that the vessel was inactive but also put a number for commercial trips taken and filled out trip expenses	Filled out number of trips instead of marking inactive
	Said the vessel was inactive and did not provide a number of trips, but put cost information under trip expenses	Skipped Q2 and entered information for Q5

Question number	Problem	Solution
Question 5 (trip expenses)	If total cost for 2022 and average cost per trip were both given	Inputted total 2022 cost (or whichever column seemed more accurate) and made a note in comments section that both columns were filled
	Gave a percentage for catch handling	Left catch handling section as a skip and added to additional costs section
Question 12 (overhead expenses)	If total cost for selected vessel and cost for all owned vessels were both given	Inputted cost for selected vessel and made a note in comments that both columns were filled
	If both columns were filled out for only 1 row	Inputted costs for the majority column
Question 14 (number of vessels that took commercial trips)	If left blank but put "1" for Q13 and filled out a number of commercial trips taken for Q2	Inputted "1"
Question 17 (quota leasing)	Checked "no" but put a cost	Checked "yes" instead and skipped questions that were not filled in
Question 22 (estimates or records)	Multiple answer choices checked off	Checked answer "both estimates and records" and unchecked all others
	If Q22 was filled in but not Q21	Inputted this as "no additional costs"
	If Q22 was skipped	Inputted additional costs section as a skip

Appendix Table 4. Follow-up cases and results

Case count	Primary gear	Cost category	Follow up result	Action
1	Handgear	New/Replacement, Repair/Maintenance, Upgrade	Successfully contacted	Updated categorization of value
2	Pot/Trap	New/Replacement, Repair/Maintenance, Upgrade	Successfully contacted	Updated keystroke error
3	Pot/Trap	New/Replacement, Repair/Maintenance, Upgrade	No contact made	Changed value to average cost for category/gear group
4	Other	Vessel	Successfully contacted	Updated keystroke error
5	Dredge	Trip	No contact made	Changed value to average total cost for gear group
6	Pot/Trap	Trip	Successfully contacted	Updated keystroke error
7	Trawl	Trip	No contact made	Updated column choice
8	Pot/Trap	Vessel, Trip, Crew payments	Successfully contacted	Kept values as is; Confirmed outlier
9	Pot/Trap	New/Replacement, Repair/Maintenance, Upgrade	No contact made	Kept value as is
10	Pot/Trap	Vessel	No contact made	Switched value to proper categorization

Appendix Table 5. Cost survey historic response rates

Year	Response (n)	Sample (N)	Response Rate (%)
2006	630	3058	20.6
2007	430	2602	16.5
2008	232	2882	8.0
2011	372	1287	28.9
2012	358	1778	20.1
2015	160	2489	6.4
Average			16.8

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