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Industry Perceptions of Measures to Affect Access to Quota Shares, Active Participation, and Lease Rates in the Bering Sea and Aleutian Islands Crab Fisheries

by
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Cover photo: A "grasping pair" of male and female red king crab, *Paralithodes camtschaticus*, found in the shallow waters of Womens Bay, Kodiak Island, Alaska. (J. Haaga - NOAA-NMFS-AFSC).



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EXECUTIVE SUMMARY

In 2010 the North Pacific Fishery Management Council (NPFMC) completed a 5-year review of the Bering Sea and Aleutian Islands (BSAI) Crab Rationalization Program. The review highlighted a suite of social concerns that have emerged in the fishery since the management change. The central issues perceived by the NPFMC were that lease rates are being charged against crew pay, the difficulty for skippers and crew to purchase quota shares, and concerns about quota ownership by people or entities that do not have a financial stake in a vessel. The NPFMC initiated discussion and analyses on these issues and ultimately decided to encourage the crab fleet to address the issues through voluntary measures. The crab cooperatives developed measures to address the NPFMC's concerns, which were implemented in 2013. The measures include the Right of First Offer (ROFO) program, which gives skippers and crew an initial opportunity to purchase quota shares, and a voluntary lease rate cap for two of the eight crab fisheries. The National Marine Fisheries Service's Alaska Fisheries Science Center developed a study in 2014 to gather perspectives on the cooperative measures from fishery participants.

This study involved interviews with a diverse group of participants in the BSAI crab fisheries where their perceptions on measures to affect access to quota shares, active participation, and lease rates were discussed. A total of 220 individuals across 6 participant categories shared their perspectives. These individuals contributed to a response rate of 25.9% of the total population of participants in these fisheries; however, the overall response rate excluding crew was 45.1%, representing individuals from 87.2% of the active vessels in the BSAI crab fisheries in 2012.

Overall, the individuals that were interviewed spoke to many reasons why skippers and crewmembers are not, as a majority, purchasing quota shares. The reasons relate to the price of quota shares, the lack of availability of shares, a lack of knowledge to navigate the system, and misgivings about the time commitment to pay off an investment and remain committed to the fisheries. These perceptions and opinions are ultimately affecting the lack of use of the ROFO program. Several interviewees related the lack of availability back to the minimal active participation requirements of the program. A majority of participants stated that they perceive a need for more extensive active participation requirements in the fishery. Interviewees related this opinion back to their understanding of the risk sharing between those who own the quota and those who harvest the quota. The minimal active participation requirements in the program have allowed an extensive leasing culture in the fishery and the specific goals of the lease rate cap are not widely understood by interview participants. There is considerable sentiment among those who were interviewed that compliance with the caps is at best less than complete. Given this, the free rider problem has the possibility of eroding the current level of compliance over time. In general, many interviewees held negative views of the leasing market and were distrusting of their fellow participants likelihood of long-term compliance with a voluntary measure.

This study is an important step forward in incorporating the views of participants in the BSAI crab fisheries into the management of those fisheries. It provides an important complement to the fisheries' economic data collection program and provides context for the quantitative data available on the operation of the fisheries. More importantly, it provides a voice to the people involved in the fishery and brings to light information about how those individuals understand and experience issues that have been a central discussion topic at the NPFMC over recent years. Specifically, the results of this study highlight underlying issues in the crab fisheries that seem to be driving the perceived issues with access to quota shares, lease rates, and active participation;

issues that are not addressed by the current voluntary cooperative measures. Additionally, it suggests areas for future research that will ultimately better inform managers about how to more effectively address these social goals.

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INTRODUCTION

The Bering Sea and Aleutian Islands (BSAI) commercial crab fisheries are some of the most lucrative fisheries in the North Pacific. Fishermen target eight distinct stocks, including (1) Bristol Bay red king crab, (2) Bering Sea snow crab (also referred to as opilio), (3) Bering Sea Tanner crab, (4) Aleutian Islands golden king crab, (5) Pribilof Islands red king crab, (6) Pribilof Islands blue king crab, (7) St. Matthew Island blue king crab, and (8) Western Aleutian Islands red king crab (NPFMC 2011). Management of the crab fisheries is done by the State of Alaska, with oversight by the North Pacific Fishery Management Council (NPFMC) and National Marine Fisheries Service (NMFS). Many of the crab fisheries are open in the winter and spring and are prosecuted by large industrial vessels due to the timing and location (Fina 2011). The fisheries for Pribilof Islands red and blue king crab and for Western Aleutian Islands red king crab have been closed since before 2005. In addition, the Bering Sea Tanner crab and St. Matthew Island blue king crab fisheries have been subject to short-term closures.

Japanese and Soviet fleets initiated commercial fishing for king and Tanner crab species in the eastern Bering Sea (NPFMC 2011, Package-Ward and Himes-Cornell 2014). The crab fisheries began to shift to domestic harvest beginning in the 1960s. With adoption of the Magnuson Fishery Conservation and Management Act of 1976, the U.S. established fishery management jurisdiction out to 200 nautical miles. Soon thereafter, domestic harvests fully displaced foreign fleet harvests. Increasing capitalization of the crab fleet led the NPFMC to adopt management strategies to limit effort in 1996. These strategies included a moratorium on vessel entry and a cap on length increases for participating vessels (NPFMC 2011). In 2000, to more permanently address the overcapitalization of the fleet, the NPFMC implemented a vessel license limitation system that replaced the moratorium. The vessel license limitation system effectively capped new vessel entry into the fishery, but did not address the existing excess capacity in the fleet (Fina 2011).

Boats raced to catch as much crab as possible before the fleet-wide harvest limit was reached, which led to a continued shortening of the season to just a few days for some stocks (Fina 2011). Safety concerns also became a significant issue as a result of the race to fish. The severe overcapitalization led the NPFMC to pursue management changes for the fishery (NMFS 2004). The NPFMC worked to address the economic inefficiencies of the fishery; issues with product value due to deadloss²; and high economic volatility for harvesters, processors, and fishery-reliant communities (NMFS 2004). The NPFMC's preferred alternative was a three-pie voluntary cooperative program,³ which the U.S. Secretary of Commerce approved through the Consolidation Appropriations Act of 2004 (NPFMC 2011). The BSAI Crab Rationalization Program (hereafter referred to as the CRP) was implemented in 2005. The program created four distinct classes of harvester shares: catcher vessel owner (CVO), catcher processor owner (CPO), catcher vessel crew (CVC), and catcher processor crew (CPC); as well as processor quota shares (PQS). Shares were further designated with regional landing restrictions and, in the case of CV shares, harvester to processor matching requirements (NMFS 2004).

² Deadloss is crab that is landed dead at the dock and cannot be sold for human consumption (NPFMC 2010).

³ The "three-pies" refer to the basic structure of the program with harvester quota shares, processor quota shares, and community protection measures. The program is also designed to allow harvesters to voluntarily join cooperatives (NMFS 2004).

The crab fleet changed drastically upon the implementation of the CRP, contracting to approximately one-third of its pre-rationalization size as quota owners tied up their boats and began leasing their quota shares to other active vessel operations (NPFMC 2008). The fishery regulations included eligibility conditions and caps on CV quota ownership holdings, but vessel use cap provisions applied only to vessels choosing to fish outside of a cooperative. This helped induce cooperative membership which facilitated quota stacking among cooperative members; and by 2009, close to 100% of all landings occurred within cooperatives (NPFMC 2012). In addition, quota leasing was incentivized due to favorable lease rates and high operating costs for vessels in the fishery (NPFMC 2008).⁴ The effects of the resulting high volume of leasing activity and distribution of benefits between vessel owners, crewmembers, and quota shareholders were highlighted in the NPFMC's 5-year review of the program (NPFMC 2010). The NPFMC was particularly concerned with lease rates, the proportion of net revenues accruing to non-vessel owning quota shareholders (hereafter referred to as passive quota shareholders), and difficulties for active participants (e.g., skippers and crewmembers) to buy into the fisheries through the purchase of quota shares (NPFMC 2012). Following the 5-year review, the NPFMC requested analysis of these and other issues that were perceived to be negatively impacting crew shares in the fishery (NPFMC 2012).

In early 2013, following a series of discussion papers, the NPFMC ultimately decided that it preferred that passive quota ownership, access to quota shares for active participants, and the impacts of lease rates on crew compensation be addressed by voluntary measures implemented by the fisheries' cooperatives. This option was selected due to the perceived costs and burden to the government to develop and implement regulations on these issues, as well as the determination that the root of these issues lay in the cooperative structure and the flexibility that membership conferred to participants (NPFMC 2012). Additionally, cooperative representatives expressed to the NPFMC that they were internally developing measures to address the NPFMC's concerns (NPFMC 2013). The NPFMC made the decision to allow cooperatives to continue to work to address these concerns, and requiring a yearly report on their progress and effectiveness of the efforts.

The crab cooperatives spent considerable time developing strategies to address the NPFMC's concerns and ultimately adopted two principal measures. First, after holding scoping meetings with fishery participants, several of the cooperatives collaborated to develop a program to address access to quota shares for active participants. The 'right of first offer' program (ROFO) was created and incorporated into the largest cooperative's (ICE) binding membership agreement, which took effect in May 2013 (Letter to the NPFMC, Crab Cooperatives 2013). The

⁴ Cooperative membership was incentivized for individuals holding CVC in particular because membership conferred exemption from active participation requirements and leasing restrictions built into the CVC ownership requirements. However, since this was not the NPFMC's original intention in the creation of CVC shares, in 2008, the NPFMC took final action on a regulatory amendment to modify the active participation requirements and eligibility for CVC shares. NMFS issued a proposed rule in 2014. The proposed active participation requirements "[...]would require a C shareholder to demonstrate that he or she had either (1) participated as crew in at least one delivery of crab in one of the CR Program fisheries in the three crab fishing years preceding the year for which the individual is applying for C share IFQ or, (2) if the individual C share QS holder received an initial allocation of C share QS, participated as crew in at least 30 days of fishing in State of Alaska or Federal Alaska commercial fisheries in the three crab fishing years preceding the year for which the individual is applying for C share IFQ (50 CFR Part 680).

program was set up to allow eligible individuals or entities to sign up through a website to receive email notifications when quota shares become available (Crab Cooperatives 2013). This eligibility requirement was designed to be the same as that used for initial eligibility for receipt of CVC (50 CFR 680.40)⁵. Individuals or entities that were initially issued CVO shares are not eligible to buy quota shares using the ROFO program.

Under the ROFO program, when quota share goes up for sale (CVO or CPO), there is a 15 day period in which eligible skippers and crew may agree to purchase up to 10% of the quota under the associated sale terms (Crab Cooperatives 2013). Upon expiration of the 15 day period, a 5 day period begins in which the quota is available for any ‘active fisherman’ to purchase for the associated sale terms. The ROFO program defines ‘active fisherman’ as a person who holds a direct or indirect ownership in a commercial fishing vessel or an individual who is a registered skipper or licensed crewmember (Crab Cooperatives 2013). After the expiration of the 5-day period, the remaining quota is available for sale to any other person or entity that meets the CRP’s eligibility to receive transfer of CVO quota shares criteria. Of the 10 existing cooperatives in 2013, 2 incorporated ROFO as binding requirements of membership, 4 relied on voluntary adherence by their members, and the other 4 did not explicitly adopt the provisions of ROFO. Table 1 summarizes the participation of each cooperative.

Table 1. -- Summary of cooperative participation in measures to address access to quota shares, active participation, and lease rates.

Cooperative name	ROFO participation	Voluntary lease rate cap participation
Alaska King Crab Harvesters Cooperative	Voluntary	Voluntary
Aleutian Island Cooperative	Voluntary	Voluntary
Alternative Crab Exchange (ACE)	Binding	No explicit adoption
Coastal Villages Crab Cooperative	Voluntary	No explicit adoption
Crab Producers And Harvesters LLC	No explicit adoption	No explicit adoption
Dog Boat Cooperative	Voluntary	Voluntary
Independent Crabber's Cooperative	No explicit adoption	No explicit adoption
Inter-Cooperative Exchange (ICE)	Binding	Voluntary; with mandatory reporting to third party
R & B Cooperative	No explicit adoption	Internal lease rate reductions
Trident Affiliated Crab Harvesting Cooperative	No explicit adoption	No explicit adoption

⁵ Initial C share eligibility include participation in one landing during three of the qualifying years and one landing in two of the three most recent seasons prior to 2002 (NMFS 2004).

As a second measure, in response to Council concerns regarding the potential effect of high lease rates on crew compensation and vessel operations, the largest cooperative, ICE, specifically asked its members (both vessel owners and quota shareholders) to voluntarily cap their lease rate asks and offers to 65% and 50% of adjusted gross revenues for Bristol Bay red king crab and Bering Sea opilio crab, respectively. Three other cooperatives have followed suit. According to representatives of ICE, the lease rate cap was designed to guide lease rate negotiations among members, but because the caps are voluntary, ICE anticipates some variation around those rates.

The voluntary cooperative reporting on these measures consists of a letter submitted to the NPFMC by each cooperative representative⁶, submitted to the record for the April meeting of the NPFMC's annual cycle. In general, the cooperative reports reflect the views of cooperative representatives and their members. Quota shareholders are cooperative members, and while non-quota share holding skippers or crew may interact with the cooperative of which the vessel they fish aboard is a member, they are not necessarily represented by the cooperative representative. Discussions at the NPFMC about the initial rounds of reporting included a preference stated by some NPFMC members for more information about the effectiveness of the cooperatives' measures (NPFMC 2014).

Purpose of this study

In order to complement the cooperative reports to the NPFMC and provide further information on the initial effectiveness of the voluntary measures, social scientists in the Alaska Fisheries Science Center's (AFSC) Economic and Social Sciences Research Program (ESSRP) initiated a study to capture broader perspectives on the voluntary measures, as well as more generally on the social issues identified by the NPFMC in the 5 year review of the program. AFSC and Pacific States Marine Fisheries Commission social scientists conducted interviews with fisheries participants regarding many of the NPFMC's stated concerns. In this report, we summarize the most salient issues explored in those interviews. We discuss the methods used, the topics covered, and review the results of the interviews, by major theme. We conclude the report with a discussion of how the results can be interpreted to inform the fisheries management process overall and areas for future research that will ultimately better inform managers about how to more effectively address the social goals and objectives of the management program.

This study is an important step forward in incorporating the views of participants in the BSAI crab fisheries into the management of those fisheries. It provides an important complement to the BSAI crab Economic Data Report (EDR) program and provides context for the quantitative data available on the operation of the fisheries, ultimately adding to what managers know and understand about the functionality of the management program. It also provides rigorously collected data that are complementary to other qualitative information that the NPFMC considers on a regular basis (e.g., public testimony at NPFMC meetings and regular conversations that NPFMC staff have with the fishing industry to contextualize quantitative data in their analyses). A significant advantage of this study is that it collected the perspectives of fishery participants using systematic methods that protect anonymity and have a broader reach than traditional NPFMC methods. Most importantly, it provides a voice to the people involved in

⁶ At the time of publication, 9 of the 10 cooperatives had been active in the discussions and reporting to the NPFMC.

the fishery and brings to light information about how those individuals understand and experience issues that have been a central discussion topic at the NPFMC over recent years. Specifically, the results of this study highlight underlying issues in the fisheries that are driving the perceived issues with access to quota shares, lease rates, and active participation.

METHODS

Research design

Following standard scientific protocols in anthropology and sociology, the methodological strategy of this study focuses on the collection of qualitative data through semi-structured interviewing. The qualitative nature of the data collection centers on mapping individual's attitudes and opinions about the topic areas and exploring the meanings that they place on processes and events they have experienced (Bernard 2006, Miles and Huberman 1994). Qualitative data collection methods, such as were used here, are best applied to research focused on building a detailed understanding of individual experiences when the boundaries of the issue are poorly understood and the context is vital to the overall understanding of the issues (Bazeley and Jackson 2007, Miles and Huberman 1994). Semi-structured interviewing uses open-ended and flexible questions to balance the desire for replication between interviews, with allowing the interviewer to follow leads with topics that emerge within the context of the interview (Bernard 2006). This style of interviewing also allows respondents to give a more thoughtful response and provides a more detailed and complex view into respondents' interpretation of events, understandings, experiences and opinions that is not obtainable through standardized survey-based approaches to data collection (Byrne 2004: 182). The analysis of the data transforms the qualitative interview transcripts into quantitative results in the form of frequency counts for themes and sub-themes that respondents talked about. More specifically, the process of coding transforms free-flowing text into nominal variables that can then be analyzed quantitatively (Bernard 2006). The contribution that this type of data can make is to provide context on the opinions and behaviors that ultimately drive the patterns observed in the existing quantitative data on these topics, and to provide practical information relevant to the current management regime governing the BSAI crab fisheries (Johns 2001, Miles and Huberman 1994, Strauss and Corbin 1990:242-3).

Participant population

We defined the population of interest as harvest quota shareholders (all individuals and entities holding CVO, CPO, CVC, or CPC quota shares), crewmembers, hired skippers (hereafter simply referred to as skippers), vessel owners, and cooperative representatives involved in the BSAI crab fisheries in the 2012-2013 fishing year (the most recent year of information available at the time of study development). We also sought input from representatives from each of the Community Development Quota (CDQ) groups and crab fishery experts. Expert respondents included individuals involved with lending, advocacy, and related activities specific to the BSAI crab fishery. Participants across all eight rationalized fisheries included under the NPFMC's

King and Tanner Crab Fishery Management Plan were included.⁷ These categories of participants are not mutually exclusive (e.g., some entities are both quota shareholders and vessel owners and some vessel owners are skippers, etc.). Therefore, there is redundancy between these categories (i.e., specific entities or individuals may be in more than one category).

To determine the overall population, we obtained ownership records and contact information for participants from the 2012-2013 fishing season. Contact information for the populations of hired skippers was gathered by matching Commercial Fishery Entry Commission (CFEC) gear operator permit numbers, reported on Alaska Department of Fish and Game (ADF&G) landings reports, with the CFEC permit registry. Contact information for crewmembers other than captains (including deck crew, engineers, cooks, and other non-processing crew) was gathered by matching CFEC gear operator permit and ADF&G commercial crew license numbers, reported in the 2012 and 2013 annual BSAI Crab EDR, with the respective registries provided by CFEC and ADF&G.⁸

Finally, we obtained contact information for vessel owners and quota shareholders from the NMFS, Alaska Regional Office (AKRO), Restricted Access Management Division. Vessel ownership and quota share ownership in the BSAI crab fisheries is complex with much of the ownership held in LLCs or other types of partnerships with multiple owning entities. Quota share owning entities are required to report their ownership structure to the AKRO on the annual Individual Fishing Quota application, including both the tiered owning entities and the percentage they hold of the larger entity. Vessel ownership structure is also reported to the individual level by percentage, as a requirement of using a hired skipper in the fisheries. Therefore, quota and vessel ownership are collected down to the individual level. However, for the purposes of this study, we used the publicly available ownership information for both vessel ownership and quota share ownership to identify and target entities in both categories. We used this strategy primarily because contact information is only available for the entity or individual that is directly issued the quota. Additionally, the individual ownership data we were able to access represented the most recent ownership structure (as of early 2014), rather than the ownership data from 2012, which was the target year for the rest of the participant population. This is due to the fact that the AKRO continuously updates its ownership information, rather than maintaining ‘snapshots’ of ownership data for a particular year. Therefore, we are unable to obtain ownership information for 2012 to match the other respondent categories. While targeting the primary ownership level may not represent the viewpoints of all owning entities, we felt that targeting one representative from each of the primary ownership entity would provide a comprehensive viewpoint of vessel activity and/or quota share leasing decisions.

Table 2 provides our best estimate counts of fisheries participants in each of the six participation categories. We refined the total number of unique participants in each category during the course of the project as participants revealed their participation and ownership affiliations. We determined that there were many duplicate contacts, both within and between

⁷ Quota shareholders in the Pribilof Islands red and blue king crab and Western Aleutian Islands red king crab fisheries were included as “participants” for the purposes of this study, even though those two fisheries have been closed for the entire duration of the CRP to date.

⁸ Fishing crewmembers are legally required to hold an ADF&G commercial crew license through ADF&G or a CFEC gear operator permit; in the annual EDR, vessel owners are required to identify all crab fishing crewmembers that worked on the vessel during the year by either CFEC gear permit or ADF&G crew license number.

participant categories, and an overlap in ownership of many entities (e.g., a vessel owner held the vessel under one LLC and held quota shares under a different LLC). We narrowed down the total unique number of respondents through information obtained in interviews, such as skippers that had retired or crewmembers that had duplicate records. Additionally, this included reducing duplication from partnerships where each participating entity or individual was already represented in the population.⁹

The type of contact information available for different types of participants varied; generally, email address, mailing address, and phone number were available for quota shareholders, vessel owners, and skippers. Some contact information listed for vessel owners was for an accountant or another person that had a role in handling the preparation of the EDR for that vessel. In that situation, we made contact with the person listed and requested that they forward on our request for their client's participation. Contact information available for crewmembers through the ADF&G crew license registry generally only included a mailing address. An attempt was made to contact all crewmembers by mail, using the address information provided in the ADF&G crew license registry, which was only partially successful. Supplemental contact information (e.g., phone numbers, email addresses, or updated mailing addresses) for all identified crewmembers was sought from vessel owners and skippers. The use of purposive sampling, such as was used here to contact crew members, is a standard method for finding hard to reach populations (Bernard 2006). Information about the research study and requests for participation were also publicized in industry news outlets (i.e., Seafoodnews.com and *Pacific Fishing* magazine) and distributed at the February 2014 NPFMC meeting.

Interview implementation

In order to capture the widest range of participant perceptions, we attempted to conduct a census of all entities under each participant category. We used the Dillman Tailored Method as a guide for structuring participant contact and interviewing methodology (Dillman et al. 2009). This included using multiple modes of contact when possible to increase the probability of reaching diverse types of participants and to encourage as many people as possible to participate. Timing of contact for different participant categories was structured around fishing seasons as much as possible given that many crab fishermen also participate in other fisheries, which elongated the time period of data collection. The opilio (snow) crab and salmon fishing seasons were the fisheries that overlapped the most with this data collection.

⁹ It is likely that duplication of the total number of participants in each category still exceeds what is reported in Table 1 given that every participant was not reached during the course of this study. With further information about the participation of those that we were unable to contact, we could likely further refine the total number of participants in each category.

Table 2. -- Participant Population in the Bering Sea and Aleutian Islands Crab Fishery (2012-2013).

Participant category	Total number of records in original data	Number of unique entities	Incorrect mailing address	Incorrect phone number	Incorrect email addresses	Total unique entities with correct contact info
Quota share holders	528	343	4	26	-	340
Vessel owners	77	75	1	1	0	75
Skippers	116	114	9	9	6	112
Crew	581	581	106	11	4	475
Community Development Quota group representatives	6	6	0	0	0	6
Expert respondents	-	13	-	-	-	13
Total*	1121	892	118	40	10	787

* The totals represent the unique population in the crab fisheries. Due to overlap between the participant categories, the total population size is smaller than the sum of each category's population.

Table 3. -- Summary of the timing and method of each type of contact made with fisheries participants.

Participant category	Date	Method
Crab cooperative representatives	January 28, 2014	Email
Registered vessel owners	March 17 to March 19, 2014	Email
Registered hired skippers and crewmembers (with email addresses)	March 20 to March 24, 2014	Email
Registered vessel owners, hired skippers, crewmembers, and quota shareholders	April 16, 2014	Letter
Registered vessel owners, hired skippers, crewmembers, and quota shareholders	May 29 to July 7, 2014	Follow-up telephone call

The project began by contacting all crab cooperative representatives to explain the study and ask for their participation in publicizing the study to their members. We then sent initial contact emails to registered vessel owners, registered hired skippers, and crewmembers with known email addresses. We also sent letters to all registered crewmembers, quota shareholders, hired skippers and vessel owners that had not already been interviewed. Finally, a follow-up telephone call was made to all quota shareholders, skippers vessel owners, and crewmembers that had not been interviewed and for whom we had obtained phone numbers. A maximum of six phone calls were made to each entity. Any participant who explicitly refused to participate was removed from the call list. If no one picked up the phone on the first attempt, a voicemail was left for the participant describing the project. A voicemail message was not left for the subsequent phone calls. Phone calls to individual entities were varied by day of the week and time of the day to increase the probability of response. Table 3 summarizes the timing and method of each type of contact.

We conducted in-person interviews in the Seattle area, the Juneau area, and Kodiak where feasible. In the event participants were not able or willing to meet in person, interviews were conducted on the phone. Interview length ranged from 15 minutes to 2.5 hours. Interviews were semi-structured with a pre-determined topic list as a starting point. The general topic list is included in Table 4. The interview topic list was initially developed based on NPFMC discussion documents that were written in response to the 5-Year Review of the CRP and subsequent NPFMC discussion papers on the topic areas of active participation, lease rates, and access to quota shares (NPFMC 2010, 2011, 2012). We refined the interview topic list through consultation with NPFMC staff, NPFMC members, industry representatives, and cooperative representatives. The content of each interview differed based on the participant's background, role in the fishery, level of knowledge about the topics, and desire to discuss specific topic areas. Each main topic and sub-topic was raised during the interviews, unless the interviewee provided information indicating they did not have knowledge or an opinion about a specific sub-topic. In that case, the interviewer could choose to not mention that sub-topic. Interviews were audio recorded with participant consent. If participants preferred not to be recorded, the interviewer took written notes. Audio files were transcribed and subsequently destroyed if participants asked that we do so.

Table 4. -- Interview topic list.

Main topic	Sub-topics
Participant's background	<ul style="list-style-type: none"> • Length of time in fishery • Vessel affiliation • Participation in other fisheries • Initial issuance of quota • Purchase of quota since program inception • Cooperative membership • Knowledge of voluntary measures to address active participation, lease rates, and crew compensation
Current measures by the cooperatives to address issues with active participation, crew compensation, and lease rates	<ul style="list-style-type: none"> • Possible metrics for evaluating efficacy, thresholds for achieving success • Timeframe for evaluating efficacy • Long-term maintenance and operation of these measures • Development process of implemented measures
Incentives of and challenges to addressing the Council's concerns about crew compensation, lease rates, and active participation	<ul style="list-style-type: none"> • Effects of the cooperatives' measures on these incentives and challenges • Definition of active participation in the BSAI crab fisheries • Perception of current level of active participation in fishery
Access to owner quota shares and the functioning of this market	<ul style="list-style-type: none"> • Interest in purchasing quota shares • Accessibility to owner quota shares for skippers and crewmembers • Factors affecting quota share buying and selling decisions • The impacts of the voluntary measures on these factors and decisions • Availability of financing for quota share purchases • The notification process for owner quota share sales
Future of the fishery as a reflection of the above three discussion topics	<ul style="list-style-type: none"> • Interest amongst potential new entrants into the fishery • Incentives and barriers for new entrants • Impacts of the issues with active participation, lease rates, and crew compensation on potential for new entry • Impacts of the voluntary measures on this potential • Other mechanisms for facilitating entry

Response rates

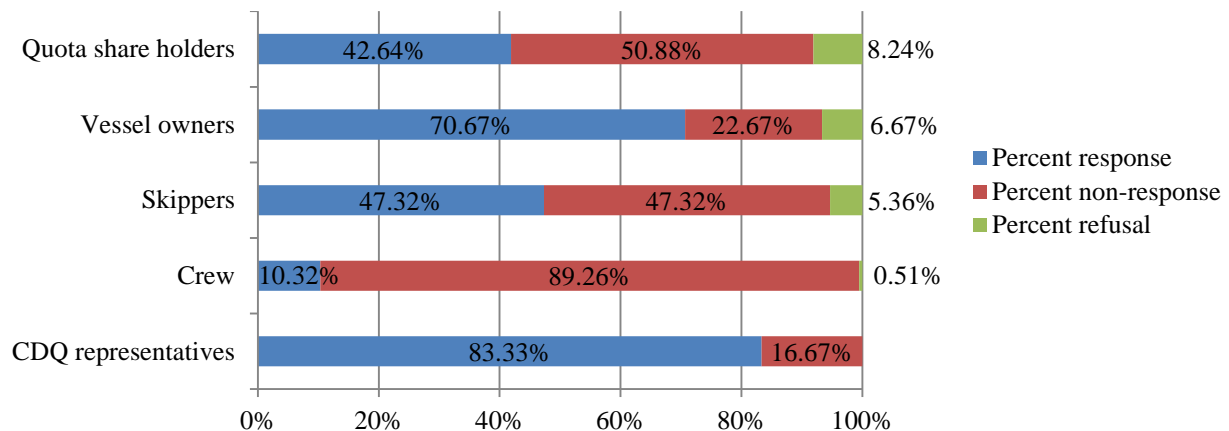
A total of 207 interviews were conducted with a total of 220 individuals across the 6 participant categories (vessel owners, quota shareholders, skippers, crew, CDQ representatives, and expert respondents); the discrepancy in numbers is due to 6 group interviews that are each treated as one interview in the analysis. Of the 207 interviews, 17.8% ($n = 37$) were conducted in person, 81.7% were conducted over the phone ($n = 170$), and 0.5% were conducted over email ($n = 1$). Response rates were calculated using the pool of participants with accurate contact information (Table 5). For example, 107 mail addresses for crewmembers were incorrect; therefore, the response rate for that category of participant is based on the subset of people for which at least one mode of valid contact information existed. Ultimately, of the interviewed crewmembers, 11 responded to the letter request for participation (22.4%), while 31 of the crewmember interviewees (63.3%) were successfully contacted through supplemental information provided to us by other study participants. Crewmember interviewees that were contacted using information provided by the vessel owner accounted for 10.2% of interviewees, while skippers and other crewmembers both contributed to 26.5% of the crewmember interviewees contacted using supplemental contact information.

Entities participating exclusively in the processing sector were outside the scope of this study. As such, they were removed from the applicable participant pool for the determination of response rates. The non-response category includes people or entities that were contacted but were ultimately unavailable during the data collection period, often due to being out fishing, and those that were scheduled for interviews but were unavailable at the designated time. The refusal category includes participants who specifically told the researcher that they were unable or unwilling to participate.

The overall response rate across all categories of fishery participants was 25.9%; however, this is heavily weighted by the number of crew non-respondents. If crewmembers are excluded, the overall combined response rate across all other categories is 45.5%. With the exception of crew, the response rates for all participant categories are considered good to excellent compared to other studies where a census of a given population is attempted (Lew et al. 2015, Groves 2006). Figure 1 and Table 5 outline the response rates by category of respondent. Responses from cooperative representatives are not presented as a separate group as nearly all representatives had other roles in the fishery, such as vessel owner or quota shareholder. Any cooperative representatives that did not fit in the other categories were aggregated into the expert respondent category.

When compared against the active vessel list for 2012, at least one individual was interviewed on 87.2% of the vessels ($n = 75$). Furthermore, although the crewmember response rate was considerably lower than other participant categories, reviewing the vessels on which the crewmembers who were interviewed most recently worked, crewmembers were interviewed from 27 different boats that made landings in the 2012-2013 fishing season, which represents at least one crewmember from 31.4% of the vessels that were active that season who were interviewed for this study.

Figure 1. -- Response rates by fishery participant category.



Refusals were highest among quota shareholders (8.2%) and vessel owners (6.7%). Response rates were considerably higher for vessel owners (70.7%) and CDQ representatives (83.3%) as compared to crewmembers (10.3%). These differences reflect the lack of contact information available due to the general transient nature of many crewmembers, as well as their unavailability while at sea.

For the purposes of analysis, participants were post-stratified following data collection into one of eight mutually exclusive participation categories (see Table 2 for a list of the categories). Table 6 breaks down the number of responses from the four higher level categories into these mutually exclusive categories in order to provide more context about those individuals that ultimately participated in this study. Classifying respondents into these mutually exclusive categories was facilitated by information obtained during interviews. Entities solely owning processor quota shares were excluded from the participant population, given that the interview topics were not directly relevant to their participation in the fisheries. These mutually exclusive categories may provide more specificity to the results, due the range of participants that the general categories of quota shareholder, vessel owner, skipper, and crewmember include. Therefore, the results are structured to first explain the results for the larger, overlapping categories of participants and then drill down into the mutually exclusive sub-categories that may provide more detail about the data.

Non-response bias analyses

We conducted statistical analyses to determine if there were any measurable biases in study participation for each participant category. The purpose of this unit non-response bias analysis is to help guide the interpretation of the results for specific interview participant categories. For the full explanation of the non-response bias analyses that were undertaken, see Appendix 1. This analysis showed that respondents had, on average, larger quota share holdings than non-respondents ($p \leq 0.05$). The analysis also suggest that the skippers that participated in the study were associated with vessels with a higher ratio of leased pounds to overall pounds landed, had been in the fishery for longer, and were associated with higher-earning vessels. Additionally, crewmembers interviewed are associated with higher earning vessels as compared to crewmembers that were not interviewed. Finally, there appears to be no significant difference between respondent and non-respondent vessel owners.

Table 5. -- Participant response rates by non-exclusive category.

Participant category	Number of unique participants	Number of unique participants successfully contacted	Participants removed from pool*	Number of responses	Percent response **	Number of non-responses	Percent non-response	Number of refusals	Percent refusal
Quota share holders	343	340	14	139	42.64%	173	50.88%	28	8.24%
Vessel owners	75	75	-	53	70.67%	17	22.67%	5	6.67%
Skippers	115	112	-	53	47.32%	53	47.32%	6	5.36%
Crew	581	475	-	49	10.32%	424	89.26%	2	0.51%
Community Development	6	6	-	5	83.33%	1	16.67%	0	0.00%
Quota group representatives									
Expert respondents	-	-	-	13	-	-	-	-	-
Total***	963	851	14	220	25.85%	581	68.27%	32	4.20%

* This category includes participants that were initially contacted but were later determined to be outside the scope of the participant pool for the project (e.g. Processor quota share owners).

** Response rates were calculated using the number of unique participants successfully contacted in each category.

***The totals represent the unique population in the crab fisheries. Due to overlap between the fishery participant categories, the total population size is smaller than the sum of each category's population.

Table 6. -- Break-down of interviewees into mutually-exclusive fishery participant categories.

High-level participant groupings	Total number of responses	Low-level participant groupings	Number of responses	% of total responses in high level grouping
Quota shareholder	139	Passive quota shareholder	67	48.20%
		Quota shareholder and vessel owner	29	20.86%
		Quota shareholder and owner/operator	20	14.39%
		Quota shareholder and skipper	20	14.39%
		Other ¹	3	2.16%
Vessel owner	53	Quota shareholder and vessel owner	29	54.72%
		Quota shareholder and owner/operator	20	37.74%
		Other ¹	4	7.55%
Skipper	53	Non-quota shareholding skipper	13	24.53%
		Quota shareholder and skipper	20	37.74%
		Quota shareholder and owner/operator	20	37.74%
Crew	49	Crew	46	93.88%
		Other ¹	3	6.12%

¹ The “Other” grouping includes low-level participant groupings with less than 4 responses in order to protect the confidentiality of individuals that participated in this study.

Data analysis

All of the audio recorded interviews were transcribed and analyzed using the data analysis software package NVivo, which is commonly used in qualitative data analysis and reporting. Descriptive coding was used to organize the interviews into parent codes that emerged during the semi-structured interviews (see the first column of Table 20 for an example of parent codes related to access to quota shares; Saldaña 2009). Within the structure of parent codes, magnitude, and in vivo coding were used to delve deeper into specific sub-codes (see the second column of Table 20 for an example of parent codes related to access to quota shares). Magnitude coding was used for themes that elicited a positive or negative response as to whether the participant was familiar with a specific topic. The bulk of the analysis used in vivo coding to draw out content precisely as reported by respondents. In vivo coding prioritizes the way participants conceptualize the topics discussed above the perceived importance of given topics as determined by the interviewer (Saldaña 2009). Additionally, it is a method of employing grounded theory in which themes are developed based on the data themselves (Miles and Huberman 1994). This framework for data analysis allowed the coding to stay true to what respondents conveyed, rather than being limited by a predetermined set of hypotheses.

A total of 212 codes were developed based on an initial coding effort of a subset of interviews that varied based on respondent type, interviewer, and timing of interview relative to the overall data collection timeframe. Frequency counts of codes were calculated and distributions were broken out by fishery participant categories to provide further illumination of results. It is important to note that due to the semi-structured nature of the interviews, the frequency analysis of response codes is based on presence of certain topics in individual interviews and the reader should not infer results from the absence of certain codes.

Table 7 shows the total number of responses analyzed by respondent type. Note that the number of responses in Table 7 is not the same as the number of individuals interviewed reported in Tables 5 and 6, given that group interview participants are consolidated into one response per interview for the purposes of the analysis. Table 8 breaks down the primary respondent types into mutually exclusive categories. The crewmember category of respondents includes participants that have additional roles in the fishery; for example, as quota shareholders. These respondent categories were lumped together in Table 8 due to the small sample size of those additional categories. Respondents were grouped after responses were compared to ensure that the results were similar across those groups. Similarly, a few participants that were skippers and minority owners in a vessel, but do not hold quota shares were lumped into the skipper category. This was, again, due to small sample sizes and concern over protecting the identity of respondents as well, but with the understanding that responses were similar with those in the general skipper category.

Table 7. -- Total non-exclusive participant pool based on unique interviews.

Respondent type	N
CDQ representatives	5
Crewmembers	48
Expert respondents	10
Quota shareholders	135
Vessel owners	52
Skippers	52
TOTAL	207

Table 8. -- Total respondent mutually-exclusive participant pool based on unique interviews.

Respondent type	N
CDQ representatives	5
Crewmembers ¹	48
Expert respondents	10
Passive quota shareholders	64
Quota shareholder and owner/operators	20
Quota shareholder and skippers	20
Quota shareholder and vessel owners	28
Non-quota shareholding skippers ²	12
TOTAL	207

¹Includes crew who have other roles in addition to being crewmembers; for example, as quota shareholders.

²Includes skippers that are minority owners of vessels but do not hold quota shares.

RESULTS

This results section is organized into four sections based on the main interview topic areas covered with interviewees: (1) access to quota shares, (2) active participation, (3) leasing, and (4) the future of the fishery. Results are presented for aggregated groups of interviewees based on their role in the fishery. The results of the study represent a range of perceptions among the distinct populations regarding various features of the CRP and voluntary measures put in place by the cooperatives. It should be noted that each of the figures in the results section present the range of information provided by respondents on a given topic. Any given respondent could have indicated any of the perspectives in the figures; therefore the frequency counts presented are not mutually exclusive.

Access to quota shares

One of the central themes of this research was to understand different participants' perception of access, or potential access, to quota share markets. We queried interviewees on their knowledge and understanding of the ROFO program and more broadly about their perceptions and experiences with the quota share market (Fig. 2; see Tables B1 and B2 in Appendix B for a breakdown of interviewees' opinions on the ROFO program and quota share market). Regarding familiarity with the ROFO program, many quota shareholders, vessel owners and skippers had heard of the program. However, the majority of interviewed skippers that were aware of the ROFO program had not actively looked into the program. For the skipper category as a whole, only nine skippers reported that they had signed up for ROFO, including skippers that hold quota shares, are quota shareholding owner/operators, and those that do not hold quota shares. Because of this, most of the skippers interviewed were not able to provide any feedback on how the program is working.

Respondents were asked to elaborate on any experiences they may have had with the ROFO program. Figure 3 shows the range of responses provided regarding individuals' experience with the ROFO as a percent of interviewees in each mutually exclusive category that were familiar with the ROFO program. Overall, a few skippers mentioned that the process of buying quota through the ROFO program was straightforward. From the seller's point of view, some vessel owners and quota shareholders reported that their experience buying or selling quota that had to go through the ROFO program was not perceptibly more difficult than a transaction outside of ROFO. Following on this experience, vessel owners who hold quota shares and owner-operators who hold quota shares perceive that the ROFO program is working. However, a large percentage of quota shareholders felt that ROFO was a good idea, but could not provide an assessment of how well they think the program is working. These interviewees included proportionally more passive quota shareholders, quota shareholder skippers and quota shareholder owner-operators. Conversely, a large percentage of non-quota shareholding skippers and crew that were familiar with ROFO stated that they think the ROFO program was not a good solution to help skippers and crewmembers purchase quota shares.

Figure 2. -- Frequency count of coded responses related to participants familiarity with the ROFO program.

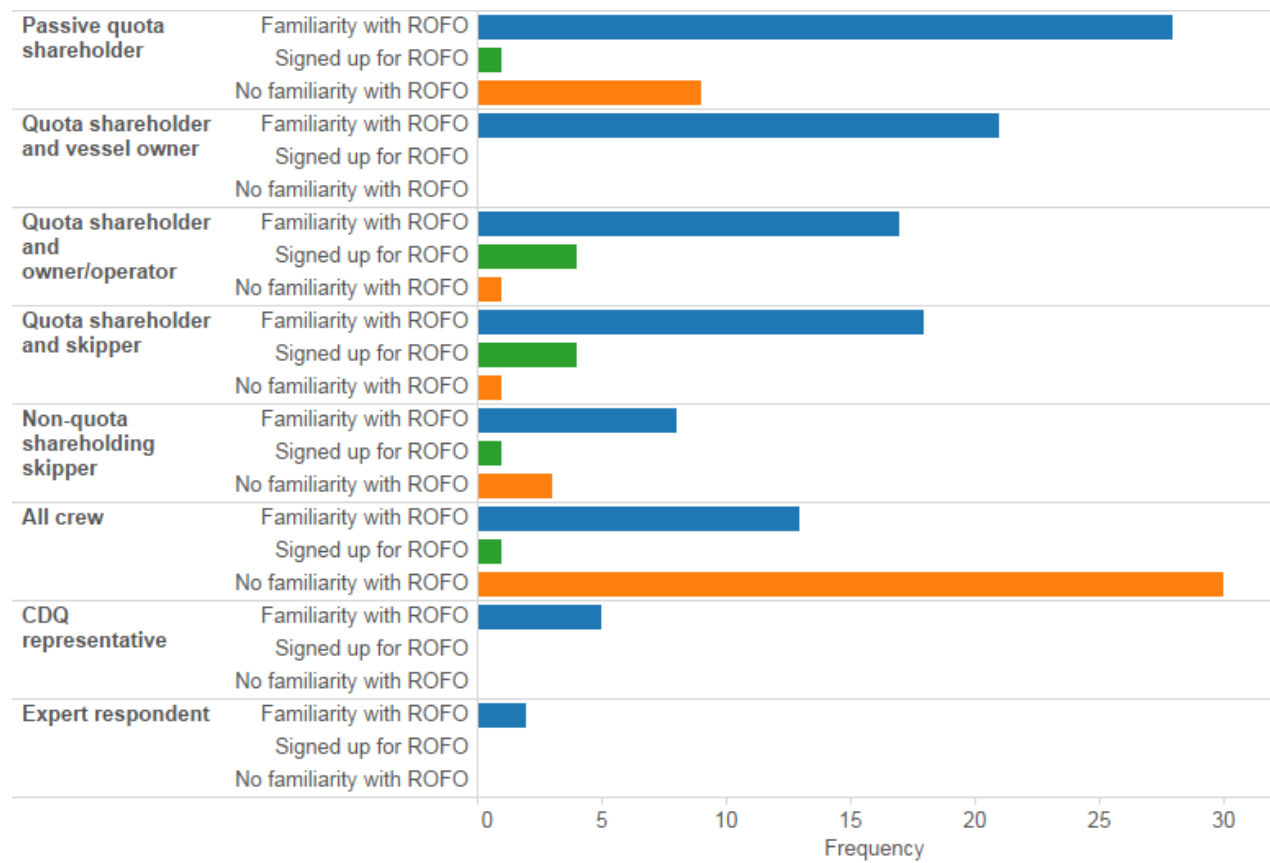


Figure 3. -- Percent of interviewees that are familiar with the ROFO program that discussed their experience with the ROFO program.



The topic of information flow between the higher level owners in the fisheries and crew was not included in the original topic list, but it emerged organically on multiple occasions. Figure 4 shows the frequency of how often a lack of information flowing to crew was brought up, both in general and specifically regarding the ROFO program. This topic emerged most frequently in interviews with crew members who identified a lack of information flowing to crew as a problem in the fisheries. Interviewers probed these interviewees for ideas about how best to convey information to skippers and crew about the ROFO program (Fig. 5). Interviewees suggested using the ADF&G crew license application, NMFS, social media and trade publications as outlets for distributing information. In addition, some interviewees suggested encouraging skippers to give information to crew about the ROFO program. The most commonly cited avenues were through skippers, NMFS and ADF&G.

Figure 4. -- Frequency count of coded responses related to participants' views on information flow between higher level owners in the fisheries and crew.

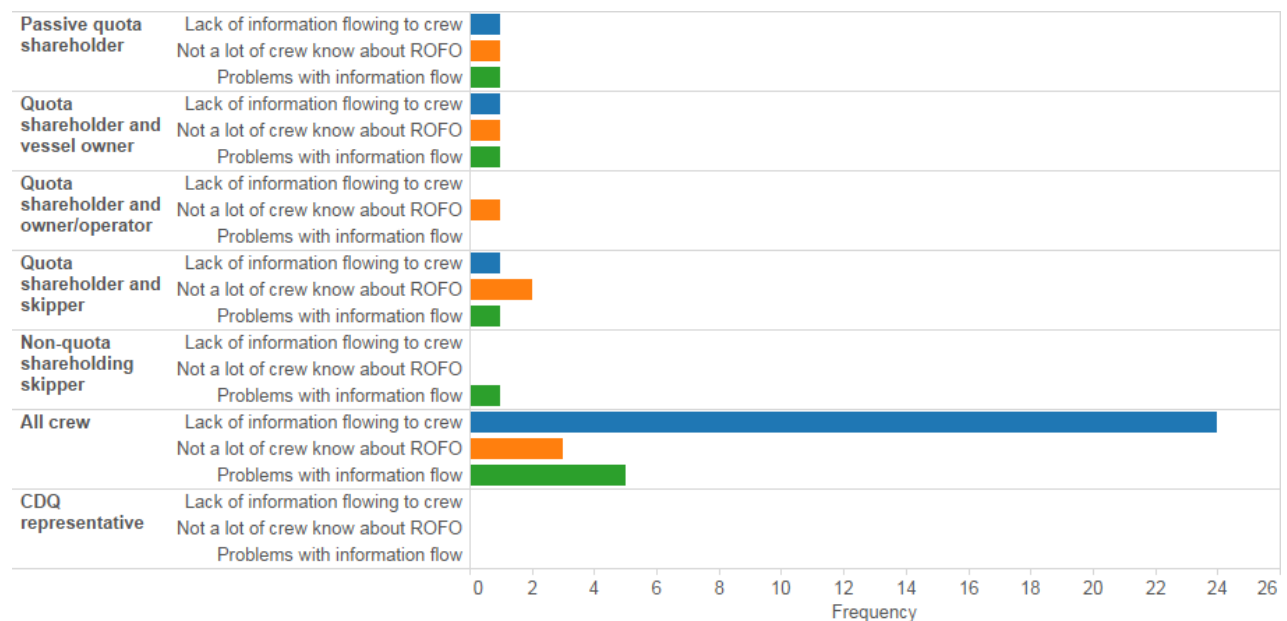
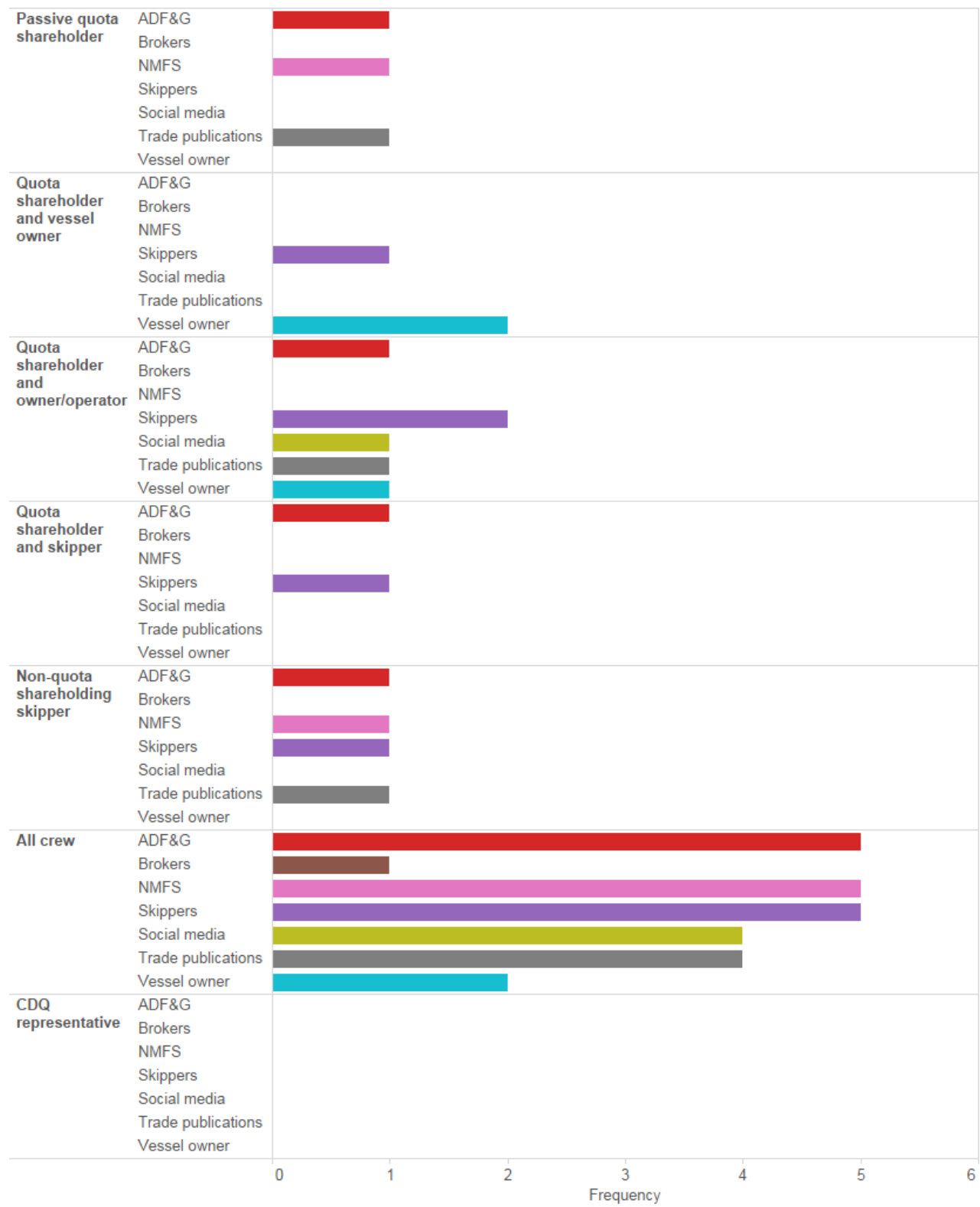


Figure 5. -- Frequency count of coded responses related to participants' suggestions for how information should be passed to skippers and crew.



Interviewees elaborated on this sub-theme by sharing their perceptions of the quota share market, including barriers to purchase, availability of quota, considerations in buying quota, and financing for quota share purchases. Quota shareholders, vessel owners and crew brought up the complexity and stress of navigating the program as a barrier to quota share purchase (Fig. 6). Interviewees in all fishery participant categories brought up perceptions of crewmembers' financial well-being as a barrier for them to be able to purchase quota shares. Proportionally, this viewpoint was most common among owner-operators who own quota shares. Across all fishery participant categories, interviewees most commonly conveyed that they perceived the price of quota shares to be the biggest barrier to purchasing quota shares. In every participant category, more interviewees spoke to the difficulties of affording the quota share price in acquiring shares than any other barrier to purchase.

The availability of quota shares on the market was another salient topic with many respondents (Fig. 7). There was a strong perception across respondent types regarding a lack of quota shares available for purchase across most participant categories. More specifically, crew, owner-operators who own quota shares, skippers who do not own quota shares, CDQ representatives and the expert respondents mentioned a lack of quota available for sale more than any other topic related to quota share availability. In addition, many interviewees pointed to the presence of differences in market or buying power of participants. This was brought up by quota shareholders that own vessels or that are skippers more than other topics associated with this theme. Interviewees who elaborated on the nature of the buying power differences most often mentioned the unique capability of the CDQ groups to purchase large blocks of quota shares. Respondents indicated that a large cash flow and the ability to use quota allocations as collateral were two primary drivers behind one's ability to secure the resources to make such purchases.

To better understand the motivations of individuals considering, or not considering, a quota share purchase, interviewers inquired about why the interviewee may or may not have thought about making a purchase (Fig. 8). For interviewed skippers, the most frequently cited consideration was the length of time to pay off the investment, which was often perceived to be at least 10 years. Based on the prevalence of this sub-topic in the interviews, the amortization was most frequently mentioned by crew, skippers who hold quota shares and owner-operators who hold quota shares. In addition, there were interviewees across most categories that indicated that other investments might make better sense. Another consideration commonly mentioned by crew was an uncertainty related to the number of years they felt they would continue or wanted to continue to work on a crab vessel.

Figure 6. -- Frequency count of coded responses related to participants' perceptions of the barriers to purchasing quota shares.

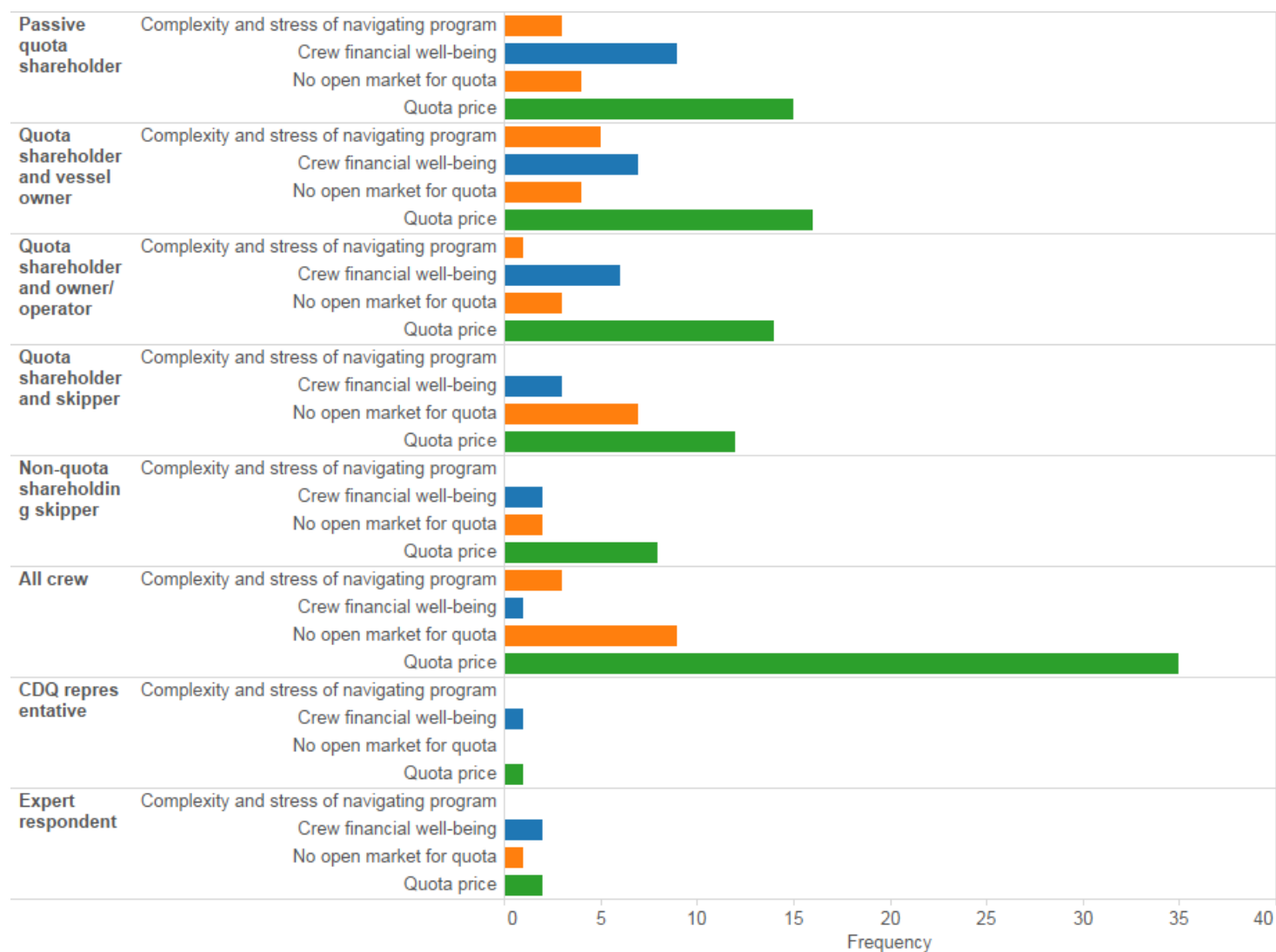


Figure 7. -- Frequency count of coded responses related to participants' perceptions of the availability of quota shares on the market.

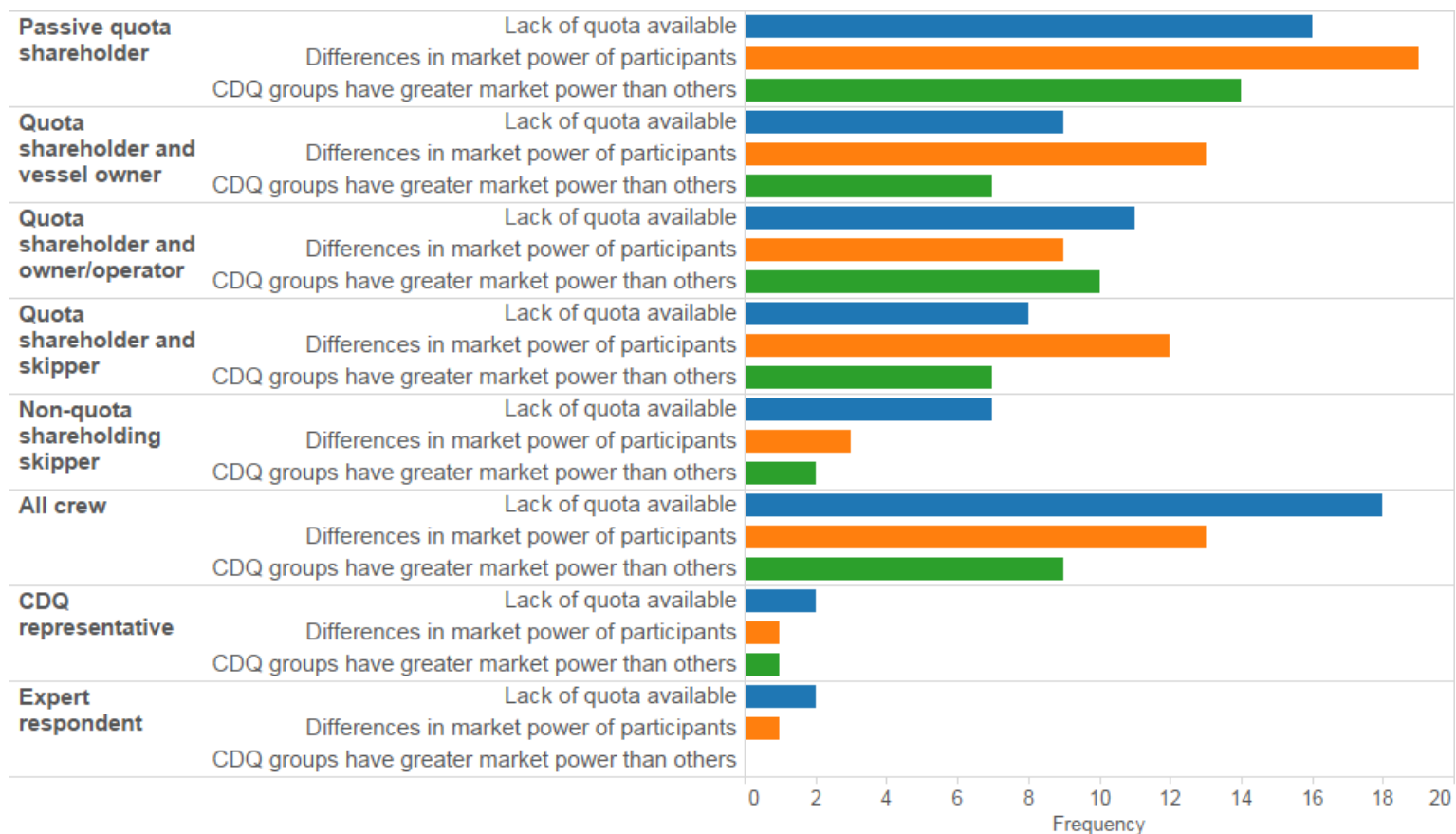
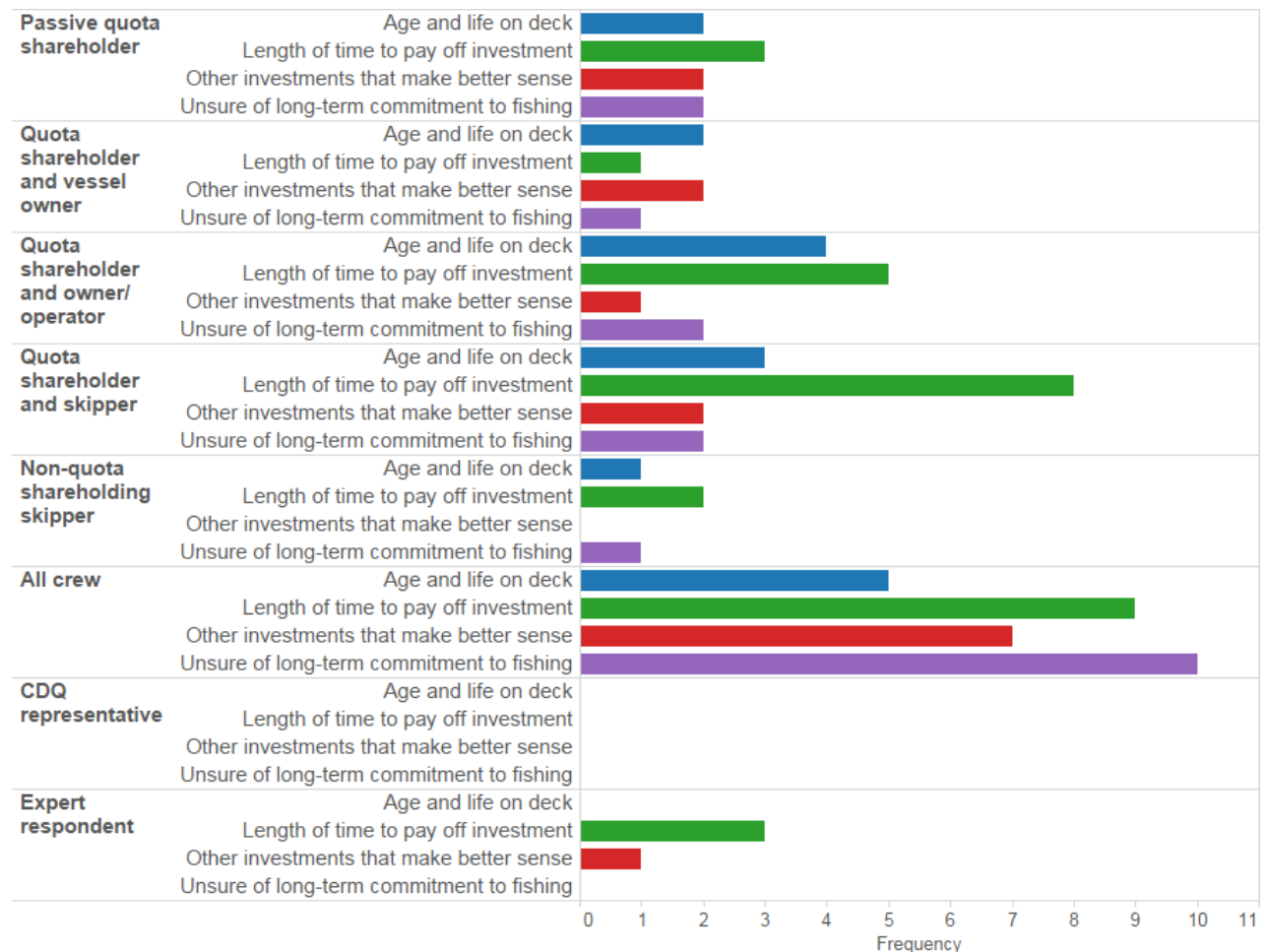


Figure 8. -- Frequency count of coded responses related to participants' considerations for purchasing quota shares.



Financing for quota share purchases was also an area of discussion in the interviews (Fig. 9). Very few of the people interviewed said they had looked into the loan program offered through the National Oceanic and Atmospheric Administration (NOAA). Those that did commented that they found it to be difficult to navigate. However, respondents did not communicate whether their experience with the NOAA loan program was different than private financing options. A number of respondents specifically noted that the NOAA loan program was not available when the BSAI CRP began, which delayed or impeded their use of federal financing for quota share purchases. Some vessel owners and quota shareholders indicated that they perceive many crewmembers to lack credit worthiness with respect to being able to secure financing for a quota share purchase. Specifically on the subject of crew making quota share purchases, interviewees in all quota shareholding categories perceived that many crewmembers were not good candidates for financing, although no crew mentioned this as a problem. Regardless of this sentiment, many crew simply had not looked into financing options. Instead, crewmembers also focused on the high price of quota and indicated that there are always people

with more money available that are waiting to buy quota, leaving them without a chance to buy smaller blocks of quota.

In spite of the discussion about barriers to the purchase of quota shares, many respondents also talked about the incentives to purchasing quota shares (Fig. 10). Across most participant categories, interviewees saw the purchase of quota shares as a commitment to continuing to fish crab or as a means to solidify their future in the crab industry. In addition, some quota shareholders and crew highlighted the advantages of the investment value of quota shares as an incentive to purchasing quota shares.

Figure 9. -- Frequency count of coded responses related to participants' experience with financing quota share purchases.

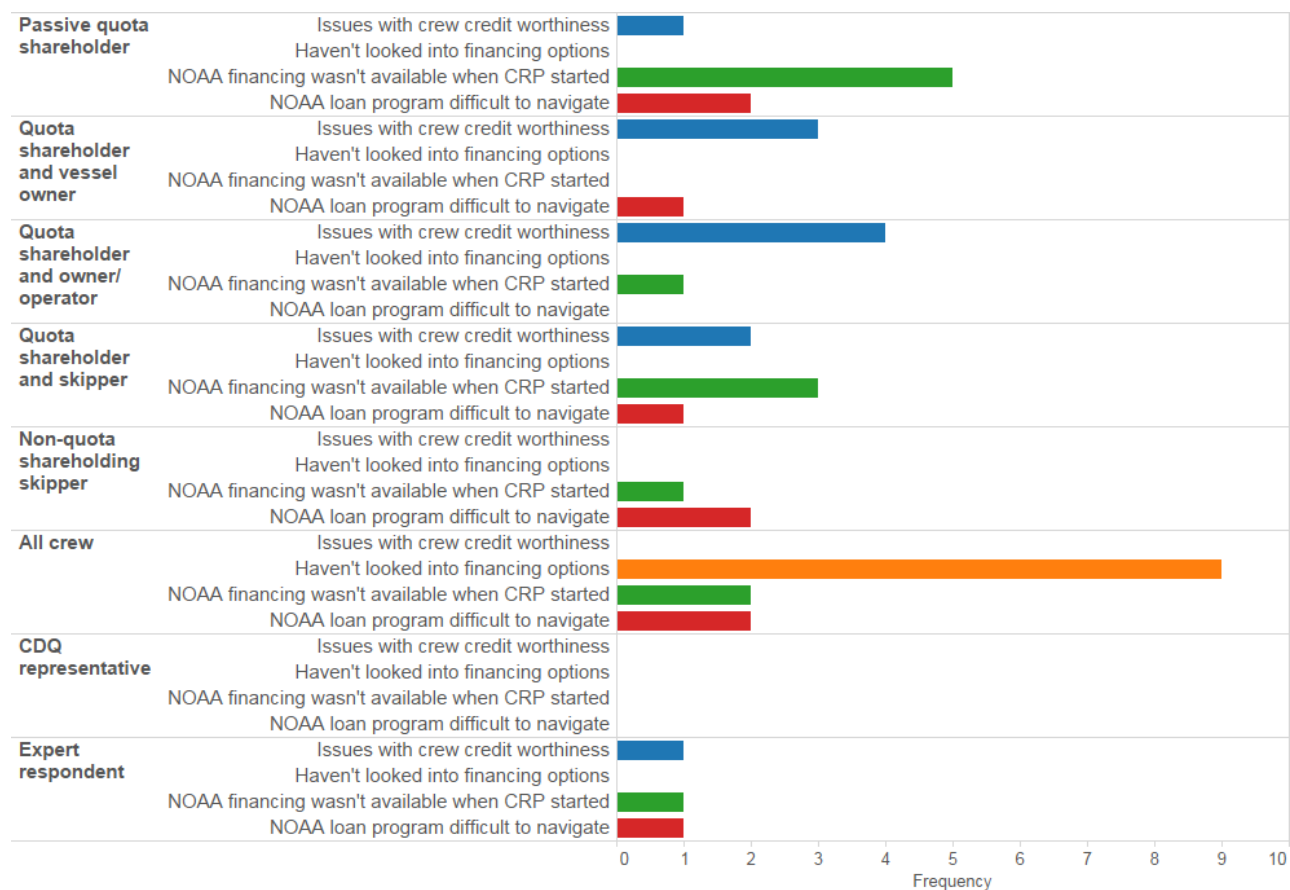
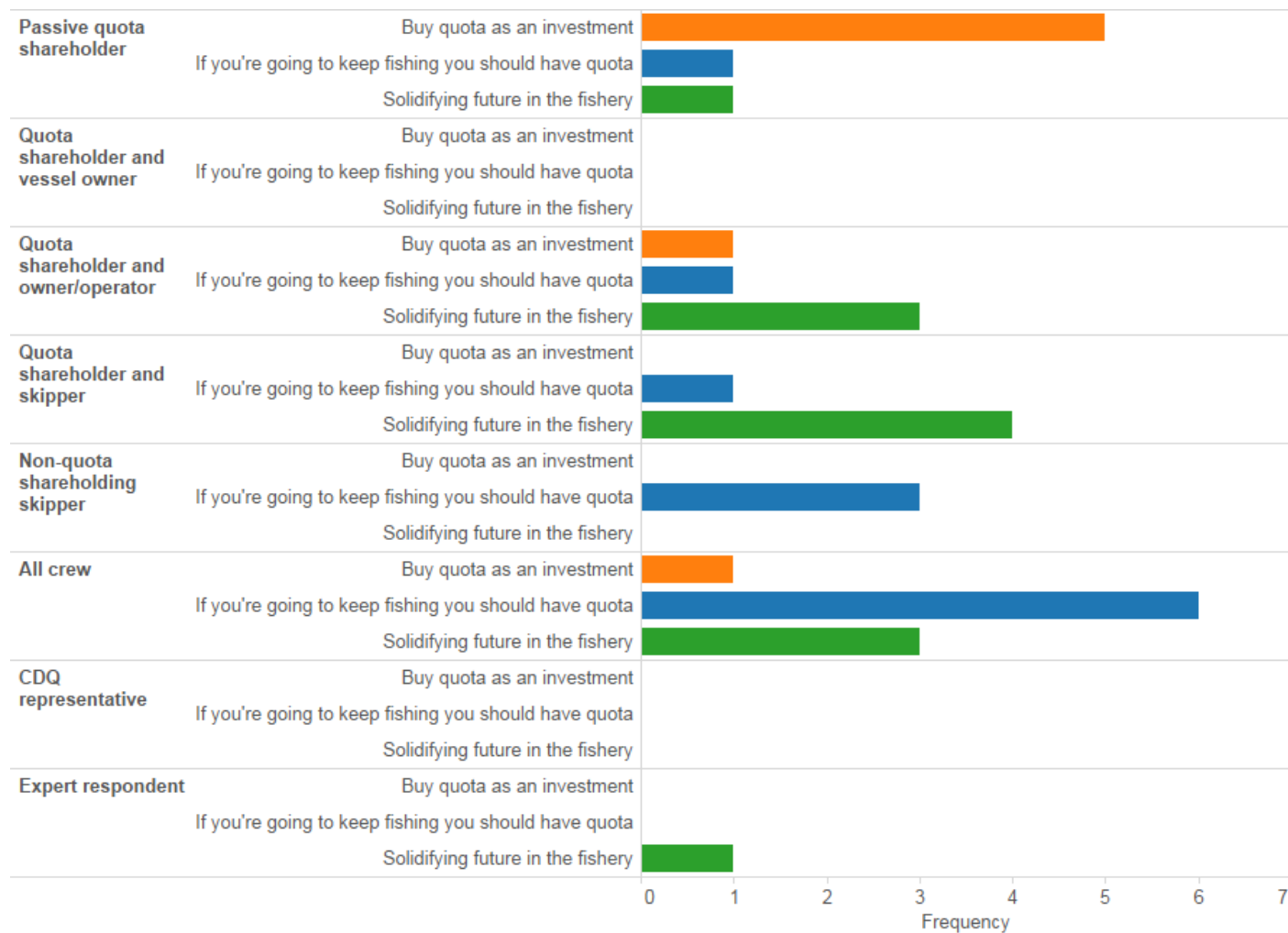


Figure 10. -- Frequency count of coded responses related to participants' perceptions of the incentives to purchase quota shares.



Active participation

The second main theme of the interviews focused on active participation in the fisheries. Interviewers explored perceptions of active participation with regards to CVO quota share ownership (see Tables B3 and B4 in Appendix B for a breakdown of how interviewees viewed active participation). In conversations about active participation, respondents were directed to consider CVO shares, rather than CVC shares, which have different requirements for ownership. Many quota shareholders and vessel owners conveyed that they do not see a need in the fishery for an additional active participation requirement on CVO shares (Fig. 11). More specifically, a subset of vessel owners who hold quota shares and passive quota shareholders conveyed that they do not agree with creating a formal requirement beyond what already exists for quota share ownership. Just as frequently, however, quota shareholders brought up the suggestion that non-active quota shareholders should not be allowed to purchase any more quota. Interviewees conveyed that an additional mandated active participation requirement could have a negative impact on those fisheries participants who had retired using royalties from their initial allocation to support themselves. However, quota shareholder interviewees indicated a need for an additional formal requirement for active participation more frequently than those that did not see the need (Fig. 11). One of the principal problems interviewees cited relates to sharing the risk of fishing. Interviewees perceive that many passive quota shareholders do not share in the financial risk or expenses of fishing. Given this, many categories of respondents indicated that absentee ownership is a problem in the crab fisheries more than any other topic. This was a very salient topic for crew especially but also for all skipper categories, who communicated that they perceived a need for an active participation requirement on quota share ownership in the fishery that goes beyond the existing regulations.

Some respondents offered up ideas for elements of an active participation requirement for owning quota shares (Fig. 12). The study did not attempt to systematically identify or assess support for specific requirements for active participation; however, several specific arrangements were cited by multiple respondents. The most common suggestion given by vessel owners and skippers was analogous to a previously analyzed, and ultimately tabled, consideration by the NPFMC of a vessel ownership requirement on CVO shares. This suggestion was specifically driven by owner-operators and skippers who hold quota shares. Crew most frequently mentioned a need to have ‘boots on deck’ as a part of an active participation requirement; however, some individuals did not think that makes sense for the crab fisheries. A few crew, skippers who do not own quota shares and quota shareholders also mentioned a need to disallow initially allocated quota from being passed down through families to non-fishing family members. Additional suggestions made included using the same eligibility requirements as exist for C shareholders and requiring quota shareholders to share in vessel expenses.

Figure 11. -- Frequency count of coded responses related to participants' views on whether there should be an active participation requirement to own quota shares.

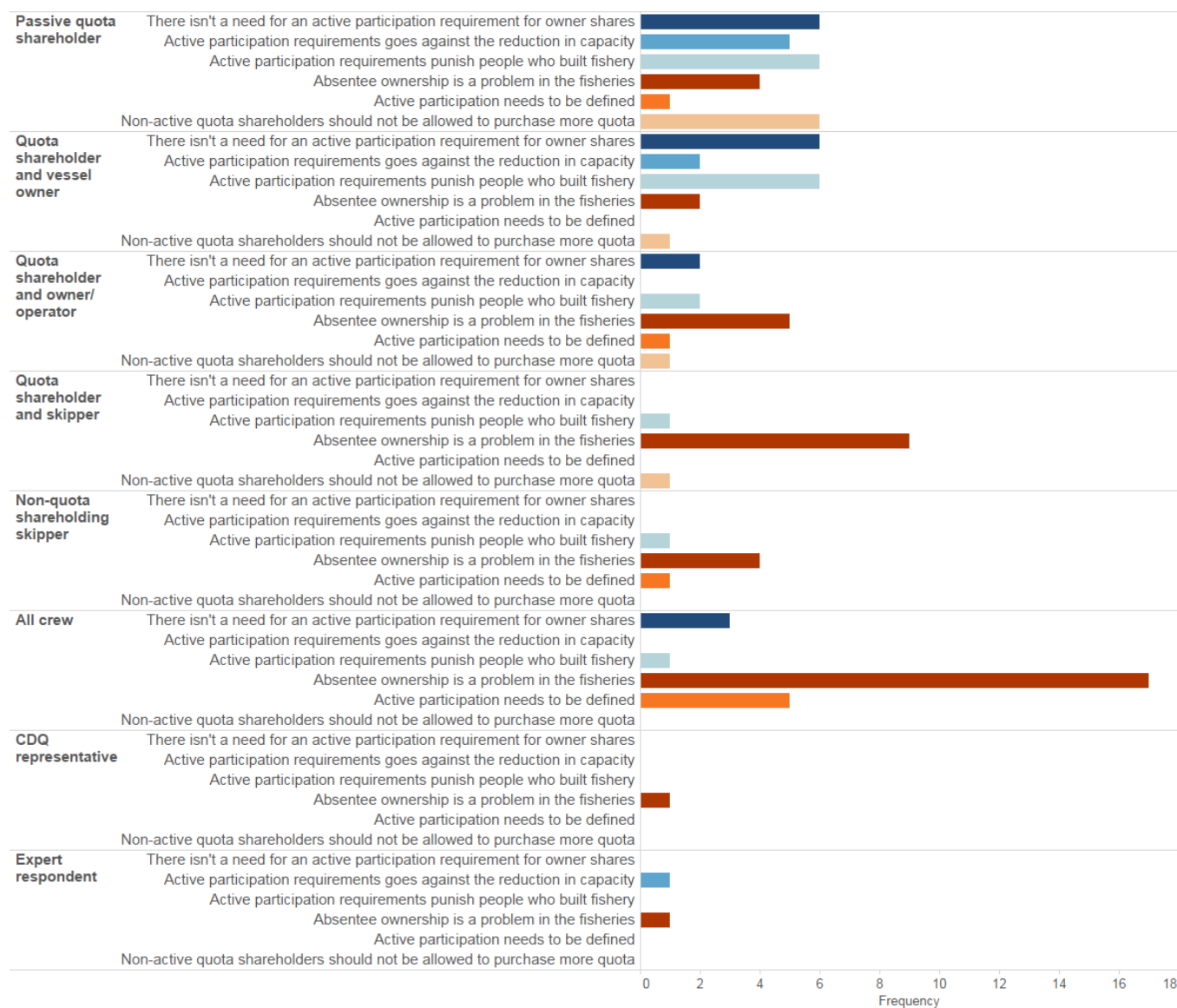
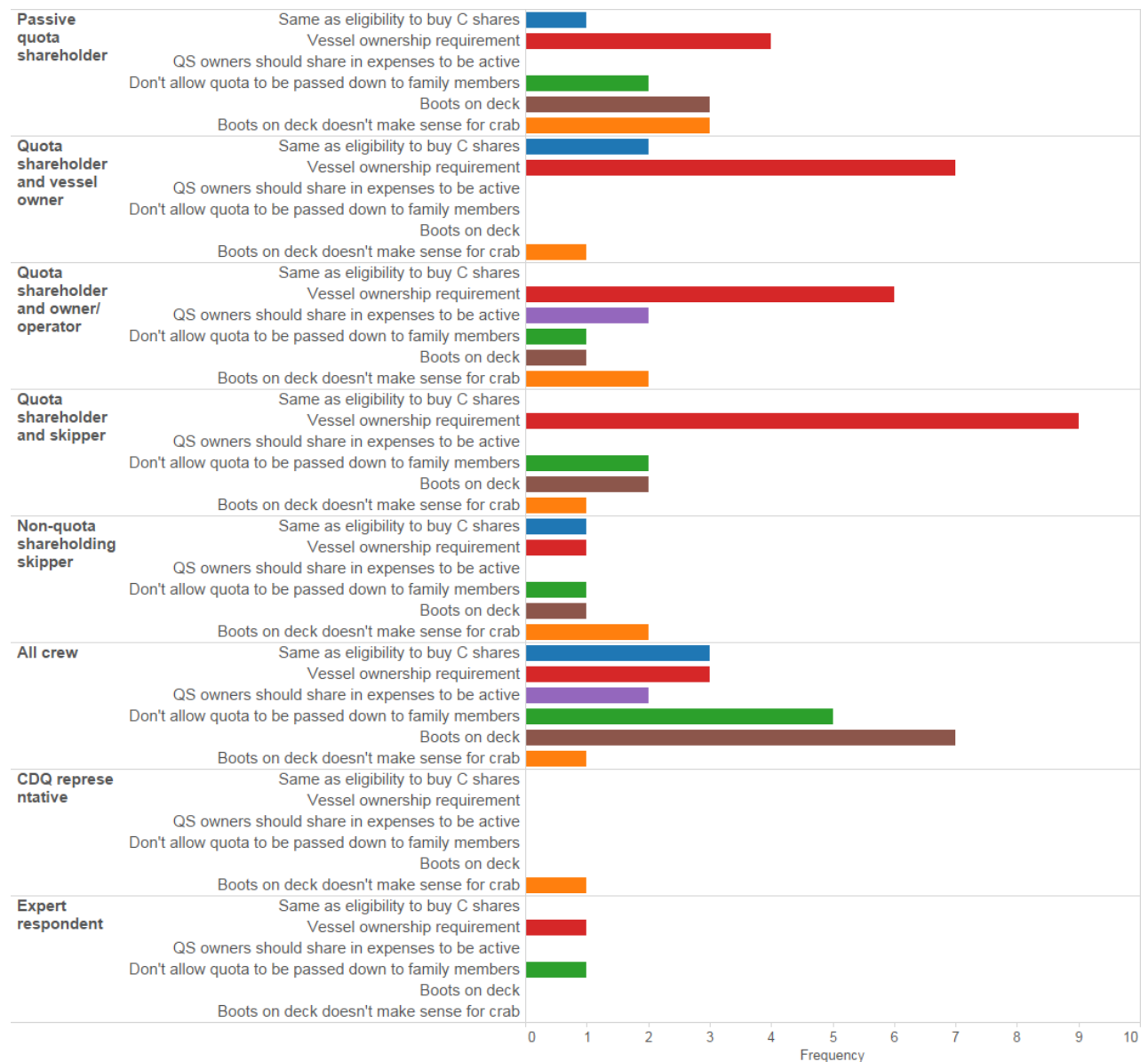


Figure 12. -- Frequency count of coded responses related to participants' views on how to define 'active participation' in the crab fisheries.



Leasing

Leasing activity comprised the third central topic of the interviews. The greatest number of interviewees was most interested in discussing this topic (see Tables B5 and B6 in Appendix B for a breakdown for interviewees' perceptions of leasing activity). With the exception of crew, every interviewee participant category predominantly expressed familiarity with the voluntary lease rate caps currently in effect (Fig. 13). Across the mutually-exclusive fishery participant categories, passive quota shareholders were the most likely to express familiarity with the voluntary cap, although in general there were individuals among all types of quota shareholders that were familiar with the rate cap. In addition, interviews provided indications of respondents' perceptions regarding consistency of compliance with voluntary lease rate caps and, to a lesser

extent, expectations regarding the ultimate efficacy of the rate caps. It should be noted that many interviewees provided broad statements about the overall compliance with the lease rate caps, while a few qualified their assessment by describing compliance as partial. All interviewees that expressed some level of compliance that is less than the majority were aggregated into a grouping that represents all other levels of compliance.

There were many quota shareholders and vessel owners that perceived the industry to be in 100% compliance with the voluntary lease rate caps (Fig. 14). Among vessel owners, there was equal frequency of perceptions that there is full compliance with the voluntary lease rate caps as perceptions that there is not yet full compliance. Although some vessel owners communicated that they perceive that the majority of people are in compliance with the caps, many interviewees expressed that the current compliance level is less than the majority of the industry. Individuals across participant categories conveyed that they believe not all parties in the industry are in compliance with the lease rate caps. In interpreting respondent's perceptions with respect to both compliance and efficacy, we do not attempt to assess the source or accuracy of the information on which those views are based.

In general, crew and skippers noted that they don't believe the voluntary lease rate caps will solve the problem at hand more than other topics on leasing (Fig. 15). Rather, some participants indicated that there will always be a problem with free riders that take advantage of the system and do not follow the voluntary rules. Following this, some vessel owners and quota shareholders expressed that they believe lease rates should be regulated by the market place rather than management entities. There was also a prevalence of quota shareholders that stated that leasing should self-regulate.

Figure 13. -- Frequency count of coded responses related to participants' knowledge of the lease rate cap.

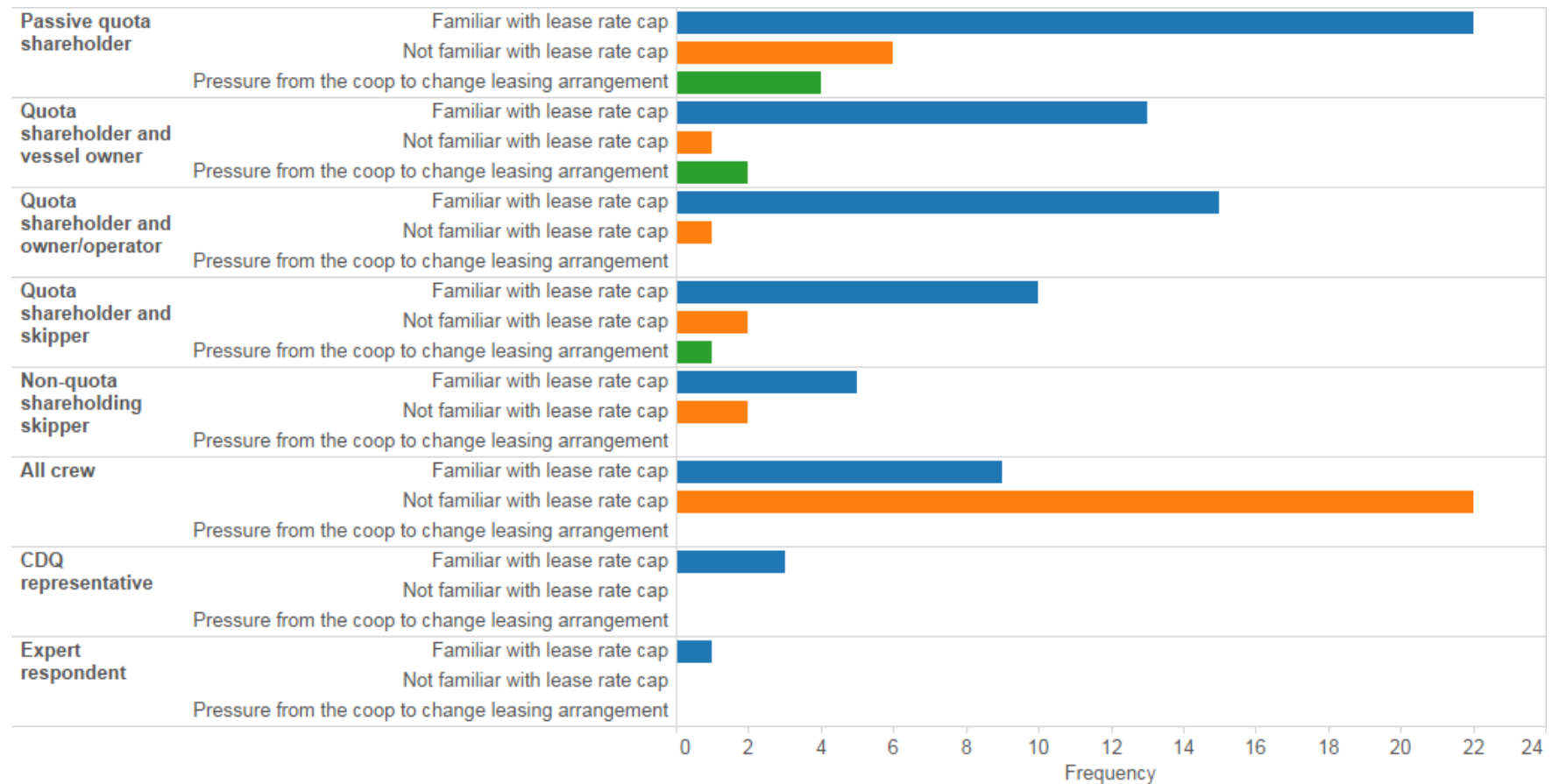


Figure 14. -- Frequency count of coded responses related to participants' experience with the lease rate cap and their perceived compliance by fishery participants.

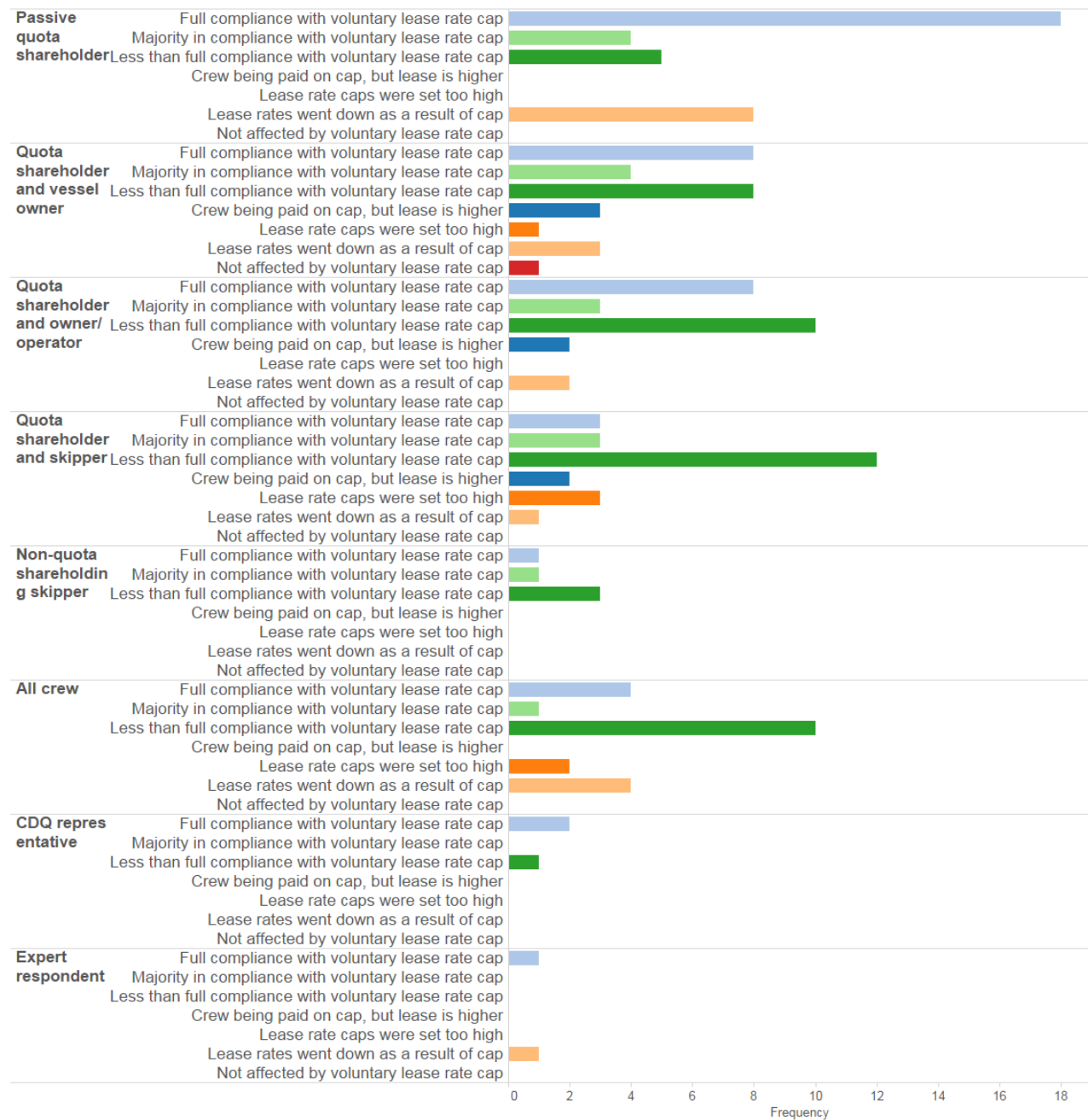
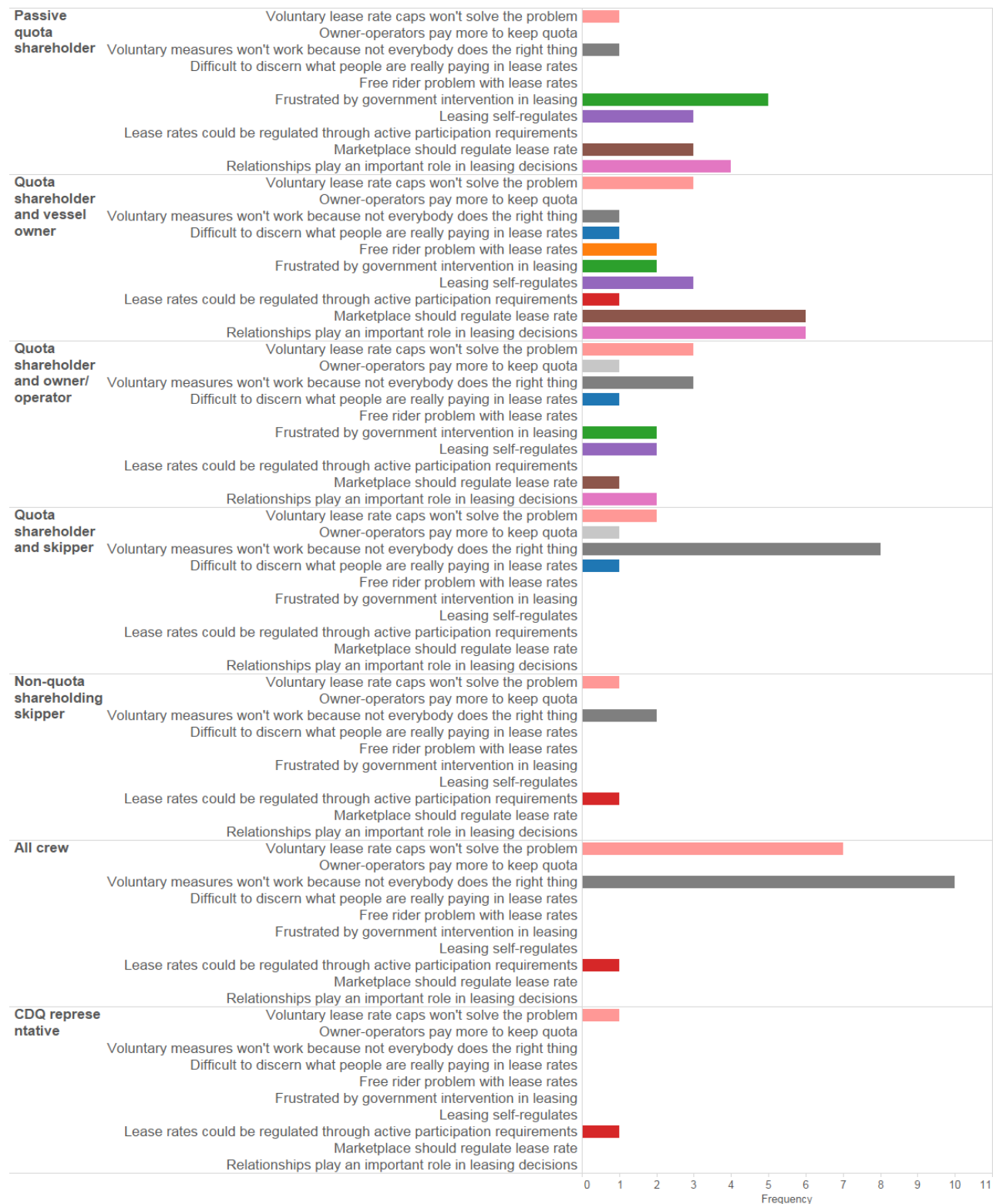


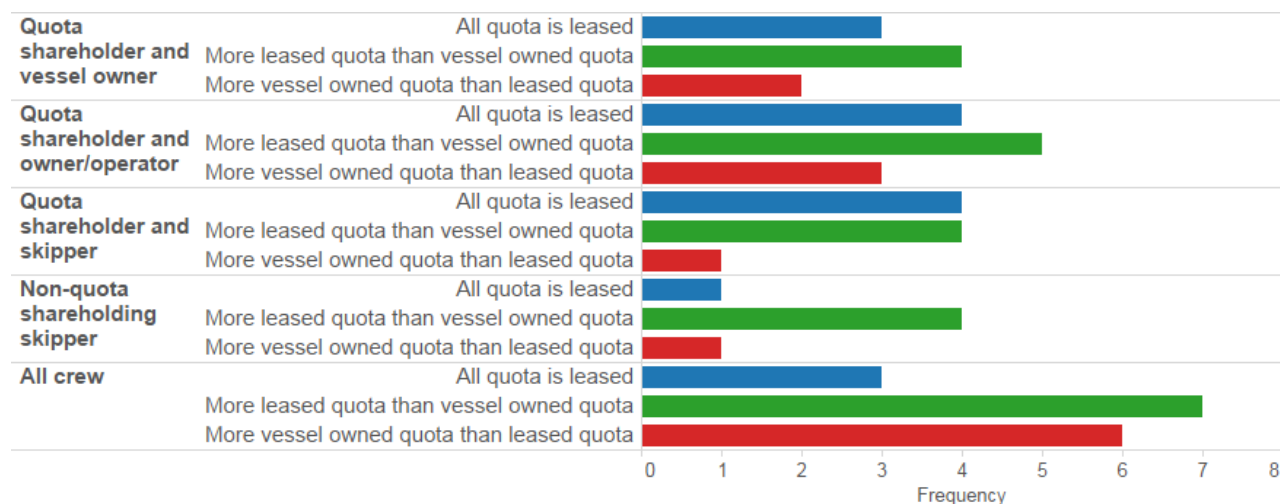
Figure 15. -- Frequency count of coded responses related to participants' perspectives on leasing activity in the crab fisheries.



In a broader sense, conversations about leasing activity and lease rates were a major component of the interviews due to many interviewees' strong opinions on the subject. It was often unclear during interviews whether interviewee comments were indicative of negative associations applied to outcomes of the quota market, which is generally functioning as intended under the CRP, or whether they reflect suspicions of unintended distortions occurring widely in the market resulting from flaws in its design or unauthorized behavior by some participants.

The practice of leasing quota was of significant interest to many interviewees. Many respondents shared information regarding the amount of leased quota compared to quota owned by the vessel that they were fishing on (Fig.16). Many skippers reported that they were most recently on a vessel in which at least some portion of the quota was part of the original allocation to the vessel owner. Overall, interviewees that are actively fishing tended to report that most of the crab that is landed on their vessel has lease payments that are deducted from crew pay. Several vessel owners reported that some of the quota fished on the vessel is not leased to the vessel; however, a handful of skippers made mention of leasing practices in the fleet in which vessel owners' are charging their crew lease rates on the proceeds from originally allocated quota. These differences indicate that there are different motivations among fishery participations regarding their leasing decisions.

Figure 16. -- Frequency count of coded responses related to the amount of leased compared to quota owned by the vessel owner on the vessel that respondents work on.



Interviewees also commented on leasing practices in general (Fig. 17). A number of crew as well as some individuals across other categories mentioned that they have heard of some vessel owners leasing crab they were initially allocated or that they own back to their crewmembers. With similar frequency, interviewees mentioned that they know many vessel owners that pay their crew straight up on the quota that they own without charging them lease fees. Interestingly, another salient topic for crew was that they see young crew members who are new to the fisheries as not having a problem with the leasing practices. Many interviewees offered opinions as to what they view as the major drivers of lease rates in the crab fisheries (Fig. 18). The most common perception across participant categories was that fishermen looking to catch more crab will compete for crab quota by offering to pay higher lease prices for crab to passive quota shareholders. Several interviewees in the vessel owner participant category reported that gains from quota leased at high rates still exceeded the lease cost and additional harvest cost of that crab when they either had an initial quota allocation or when they were able to lease other quota at a lower rate. Additionally, some vessel owners conveyed that they perceived that lease rates (i.e., the ‘rent’ or price of leasing) had risen precipitously in the fisheries as passive quota shareholders sought more money from vessel owners for their leased quota.

Ultimately, there have been some impacts of the lease rates that have affected crew. Crew respondents brought up a perception of negative impacts on their compensation from lease rates more than any other topic (Fig. 19). Some crew also mentioned that they work longer hours for less money since the CRP was instituted. In addition, some crew mentioned that the lease rates have affected how long crew members stick around in the fisheries. On the other hand, some quota shareholders and vessel owners noted that lease rates have not had an impact on crew compensation or that high lease rates are offset by pulling in a lot of quota in terms of what crew take home at the end of the season.

Figure 17. -- Frequency count of coded responses related to participants' perspectives on the equity of leasing activities.

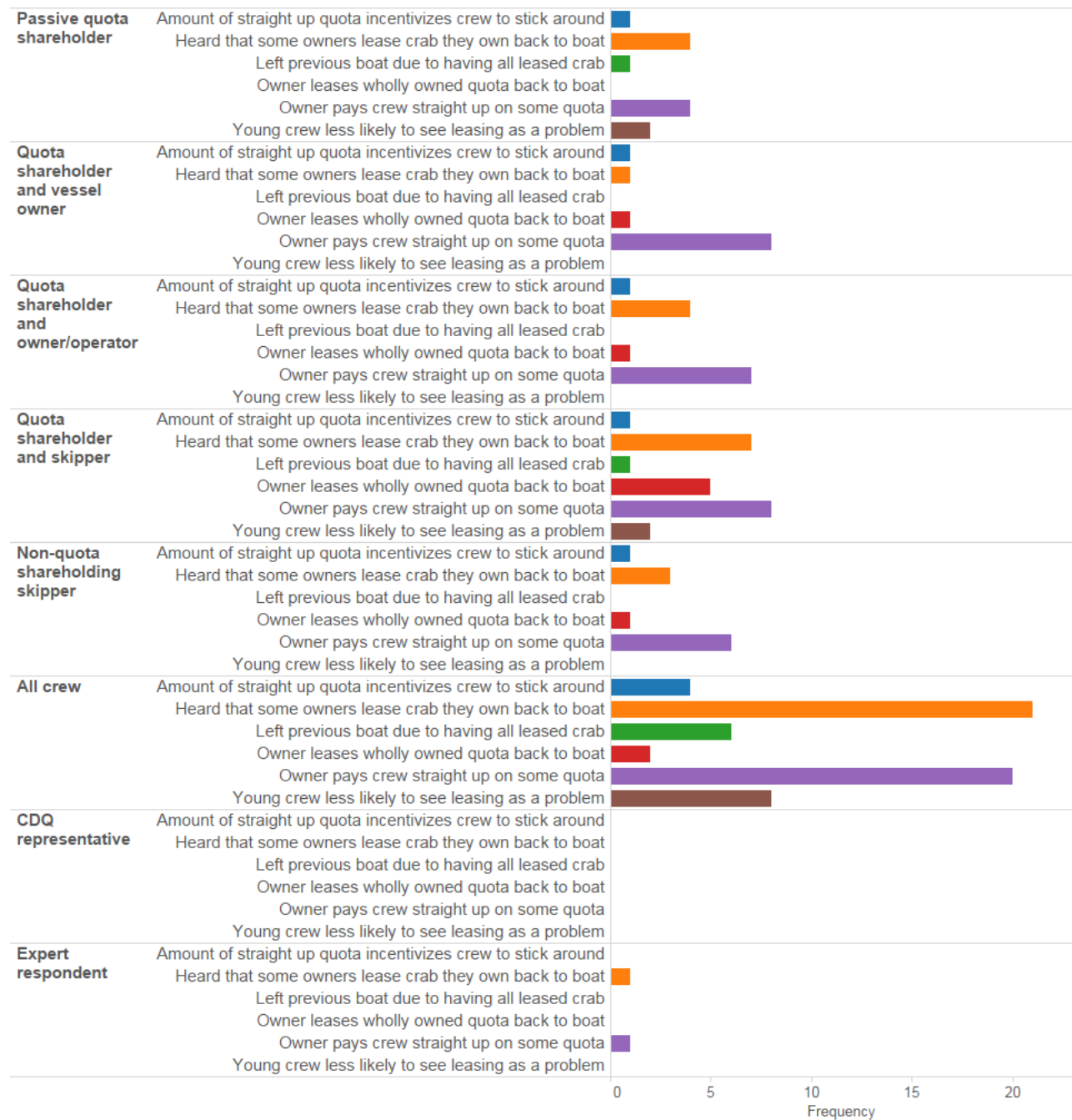


Figure 18. -- Frequency count of coded responses related to participants' perspectives on the drivers of lease rates in the crab fisheries.

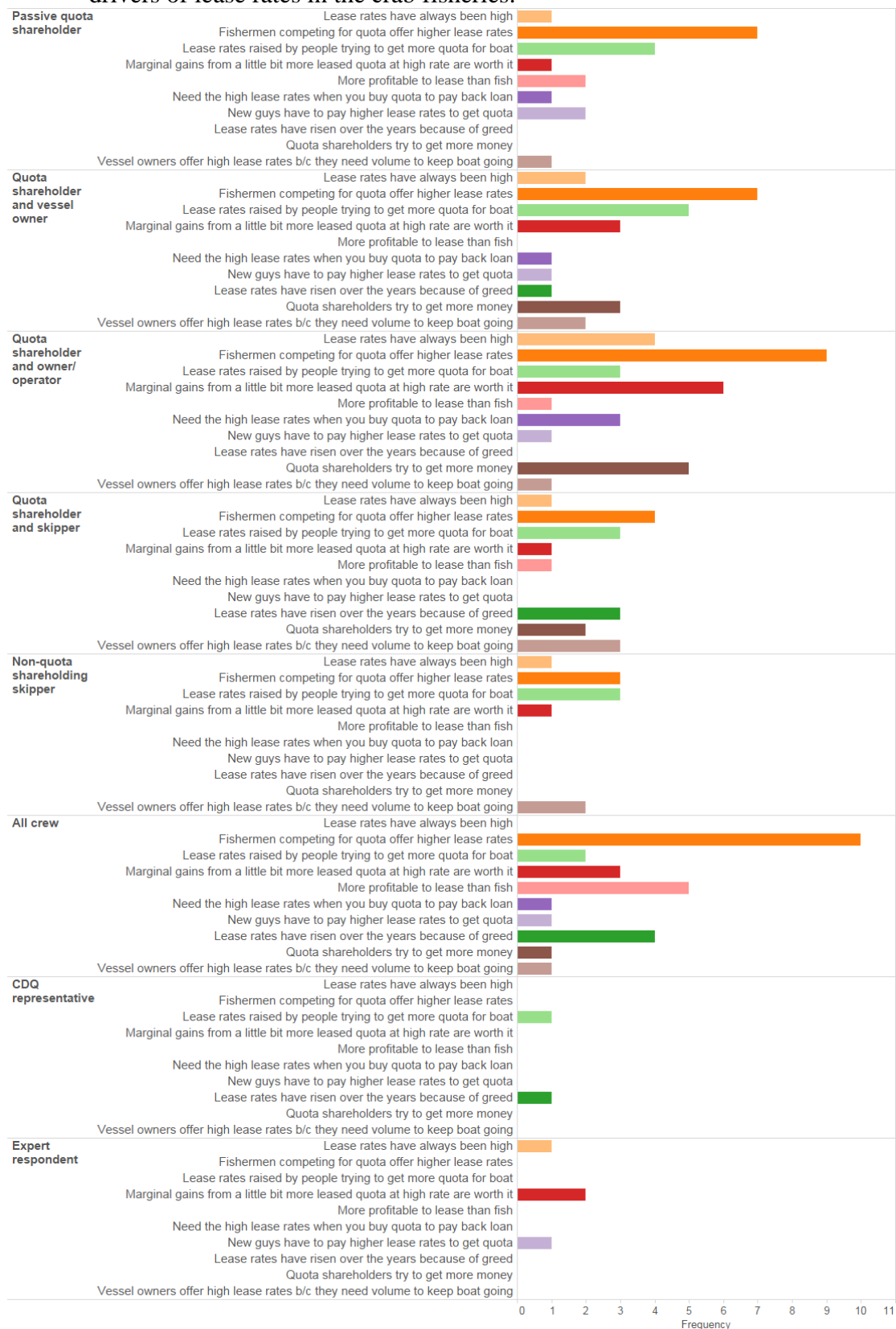
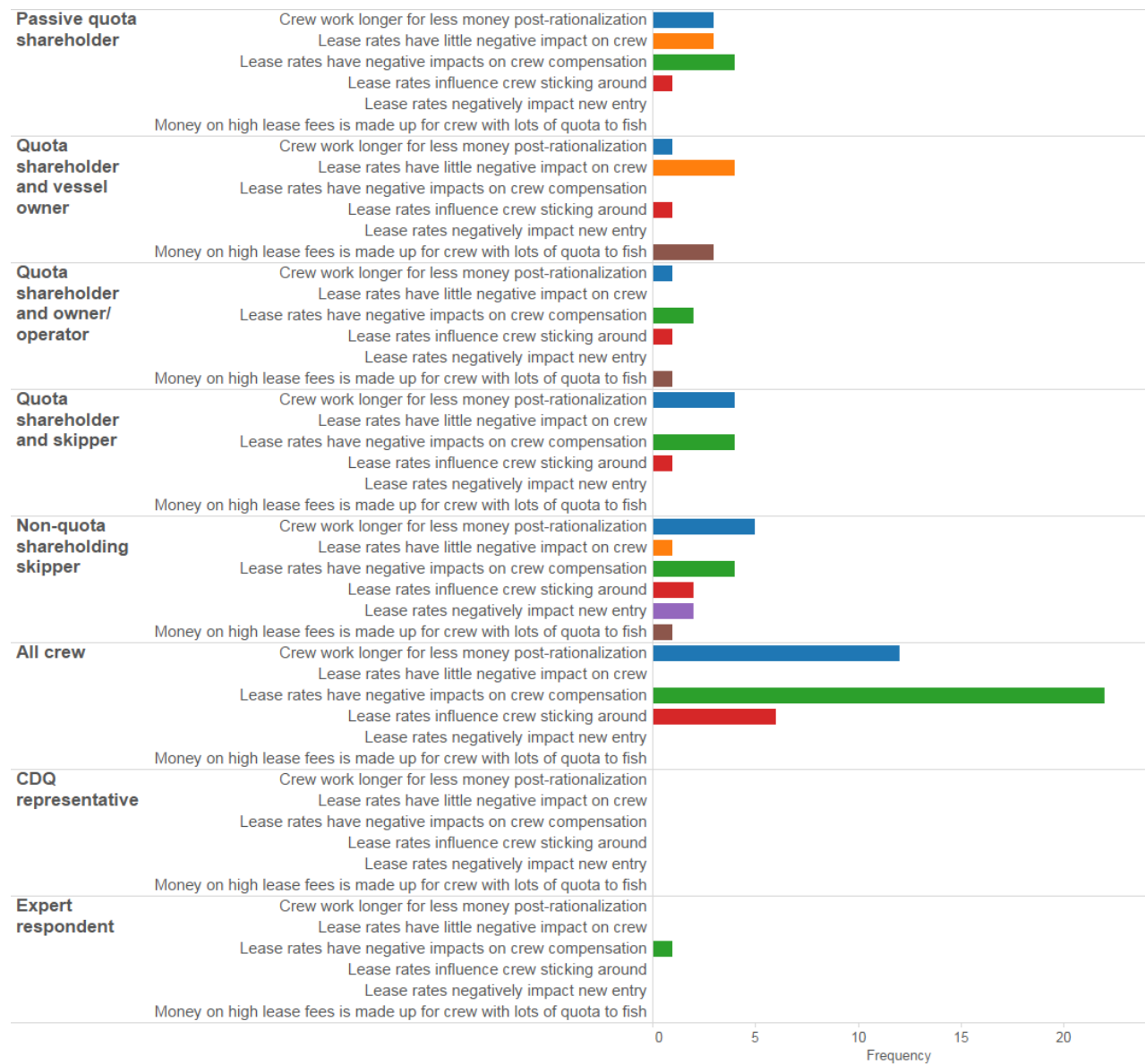


Figure 19. -- Frequency count of coded responses related to participants' perspectives on the impacts of lease rates on crew compensation.



Future of the fishery

For many interviewees, the topics of access to quota shares, leasing, and active participation fit into a larger conversation about the future of the fishery post-rationalization (see Tables B7 and B8 in Appendix B for further detail). Some interviewees discussed trends they see increasing in the future about crew in the industry (Fig. 20). Quota shareholding skippers most frequently mentioned that crew are becoming less and less experienced and that it is hard to find crew that will stick around for very long. Crew members and quota shareholding skippers also mentioned a perception that crew are becoming less experienced and that they are concerned that the fisheries are moving towards increased use of non-professional immigrant labor. This perception was also expressed by at least one respondent in most of the other participant categories. This was often followed up by comments that crew as a whole were losing experience as experienced crewmembers are leaving the fisheries. Some interviewees expressed concerns that these issues reflect larger trends in the composition of crew in the fleet. Additionally, skippers and crew, as well as some vessel owners and passive quota shareholders, shared that they were concerned that the fishery would move to a daily wage system in the future.

Many interviewees also brought up concerns about the future of the crab fleet with regard to the ‘graying of the fleet’ (Fig. 21). Some skippers conveyed that they observed a graying of the fleet and that quota shareholders, vessels owners, and skippers were, on average, older than they used to be. Additionally, some vessel owners also expressed concern about the potential impacts about the graying of the fleet. The graying of the crew specifically was also a concern for interviewees. Some interviewees pointed to the lack of new entrants in the fishery as a companion issue to the graying of the fleet.

A potential cause of the lack of new entrants in the fishery is the strong perception of interviewees that pathways to ownership do not exist anymore (Figs. 22 and 23). The most salient issues for crewmembers interviewed were a belief that pathways to move forward in the fisheries don’t exist for most crew and that many crew were looking towards Alaska’s salmon fisheries as a way to move beyond working on deck. Interviewees in most participant categories expressed the sentiment that there are few opportunities for crew to move up (Fig. 23). The reasons expressed as to why pathways to move forward in the fishery have been impacted were different for different participant categories. Crewmember interviewees stated that pathways forward were less apparent because skippers stay in the wheelhouse longer and therefore there are fewer opportunities to become an operator or said there were fewer opportunities simply because there are fewer boats in the fleet post-rationalization. The impact of fewer boats on pathways to move forward for crew was a common response for skippers, passive quota shareholders and crewmembers. On the subject of whether they were pursuing pathways to move forward, some crewmember interviewees communicated that they did not see a long-term future for themselves in crabbing due to this constraint. One of the most salient issues for crewmembers was that opportunities to move up in the fishery only exist for people with family connections (Fig. 22). The importance of such family legacies was mentioned by at least one person in most of the participant categories.

Figure 20. -- Frequency count of coded responses related to respondent perceptions of the future of crew composition in the crab fisheries.

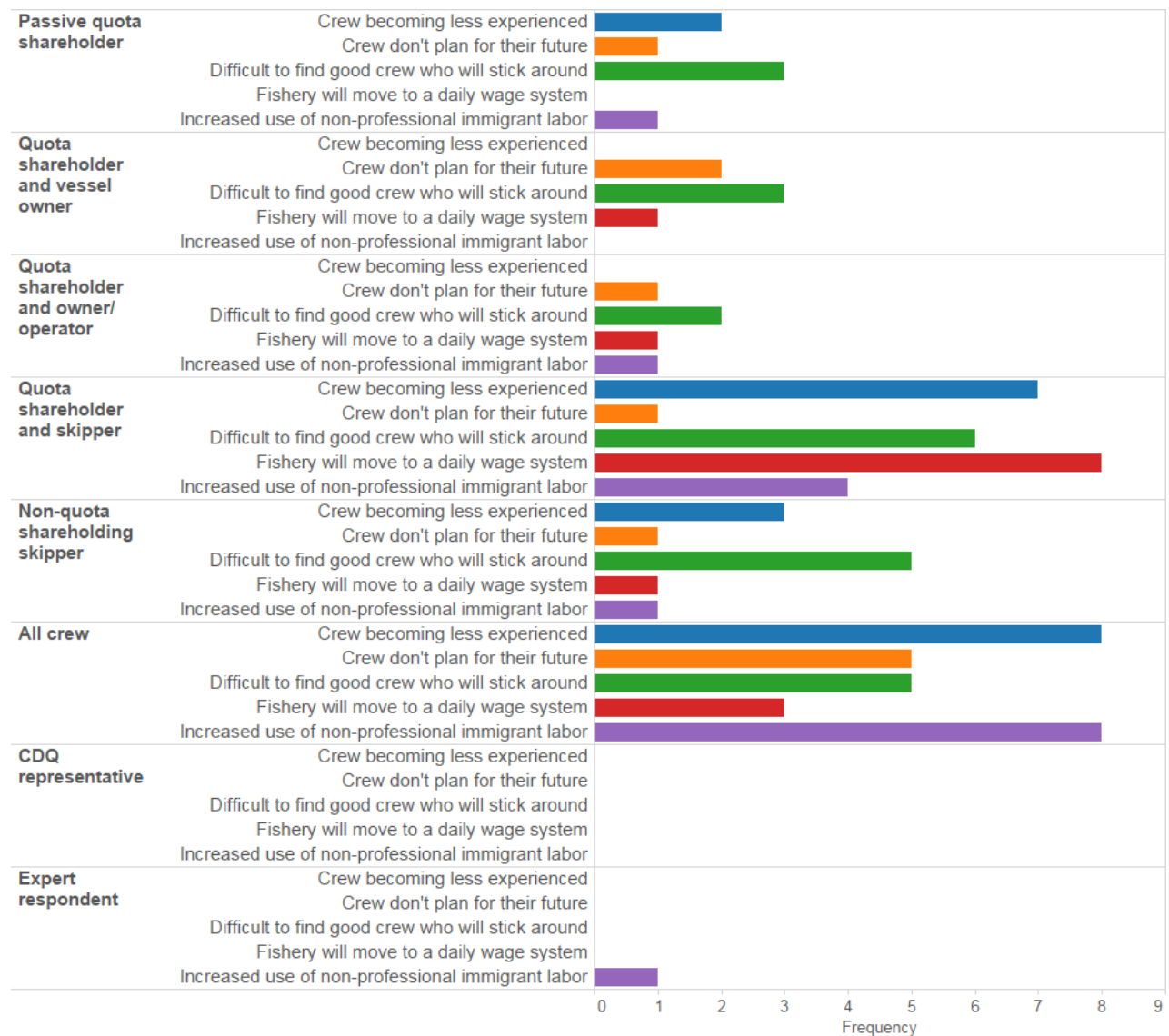


Figure 21. -- Frequency count of coded responses related to respondent perceptions of the ongoing 'graying of the fleet'.

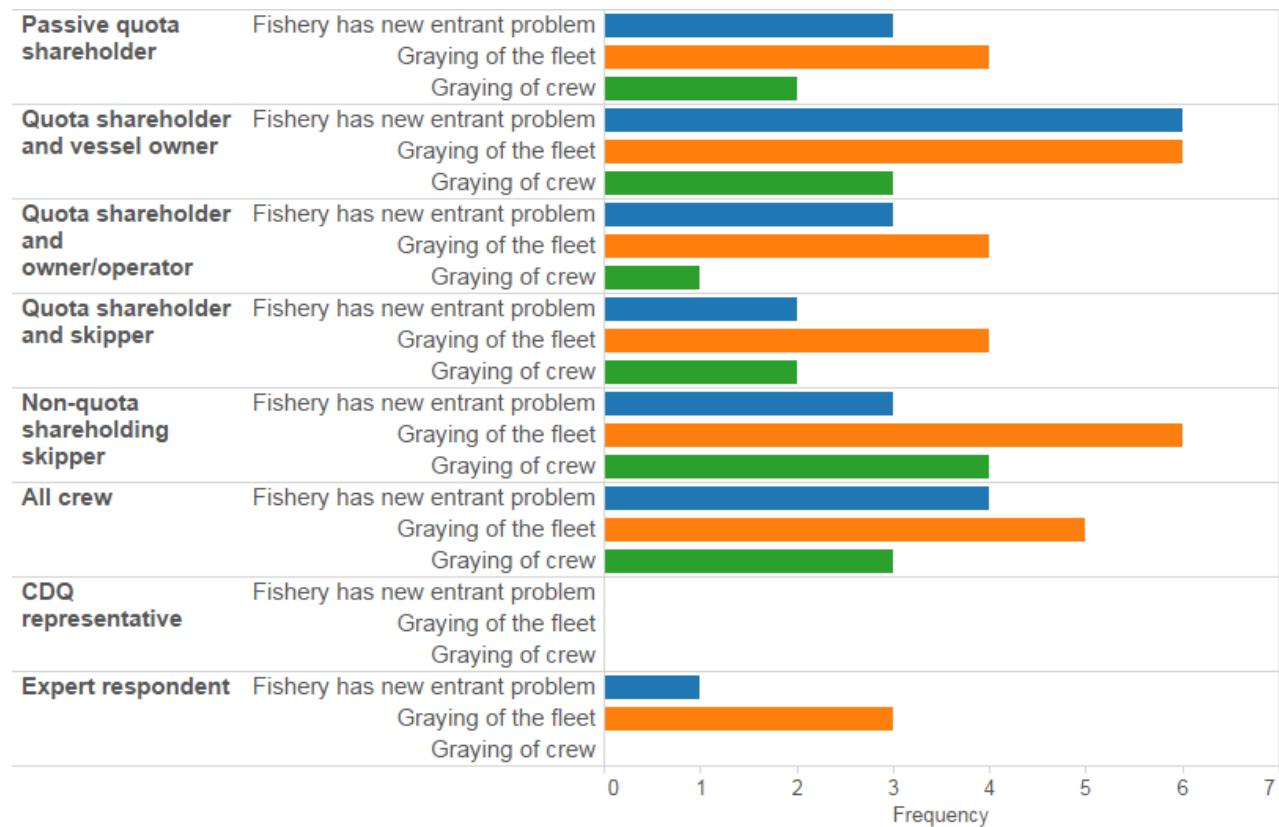


Figure 22. -- Frequency count of coded responses related to respondent perceptions of the importance of family legacies in the crab fisheries.

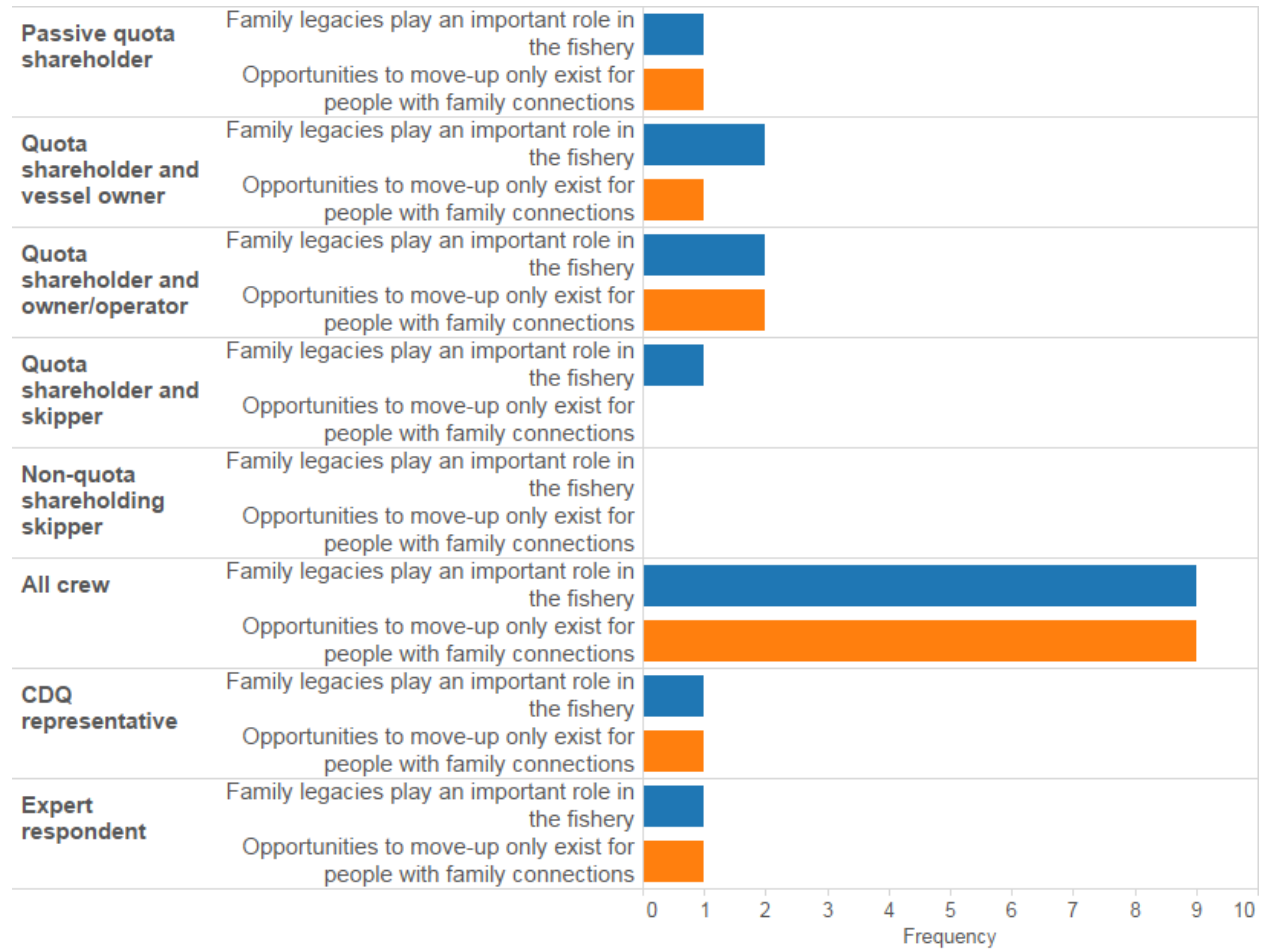
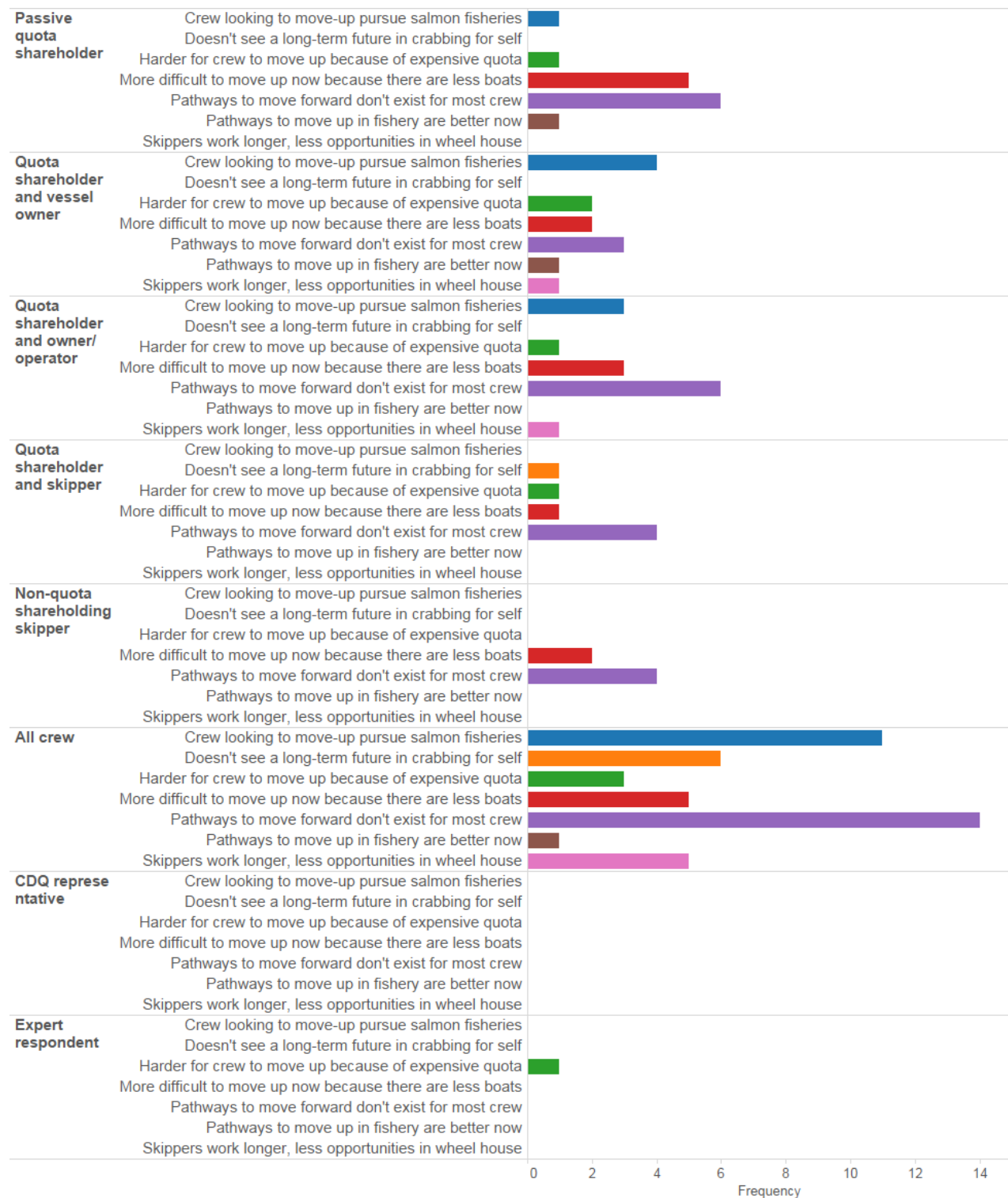


Figure 23. -- Frequency count of coded responses related to respondent perceptions of pathways to ownership in the crab fisheries.



DISCUSSION

Current views and perceptions of individuals that are involved in the BSAI crab fisheries were illuminated this study. Fishery participants brought up a myriad of discussion topics through prompts related to access to quota shares, active participation, leasing activity and the future of the crab fisheries. The following provides a discussion related to each of these topics.

Access to quota shares

The results of this study suggest that in spring and summer 2014, most skippers were familiar with the ROFO program. With crewmembers and skippers being the intended beneficiaries of the ROFO program, its success depends to some extent on them being aware of the program and ultimately using it to purchase quota shares. Towards the end of the data collection timeframe, the industry groups involved in the creation and operation of ROFO increased advertising efforts in trade publications and local industry media outlets. Additionally, they sent direct mailings of ROFO information to all active vessels. This will likely have helped promote the program; however, both skippers and crewmembers interviewed in this study suggested outreach through the ADF&G and NMFS licensing and permitting applications and information outlets as another avenue for increasing awareness. Quota share holding skippers were the group of interviewees most likely to have already signed up for ROFO, which may indicate that skippers that are interested in purchasing quota shares have already taken steps to do so. Although relatively few of those interviewed had personal experience with the ROFO program, feedback from those that had already participated in the ROFO program in some capacity was mostly positive. Those that had acted on their ROFO eligibility found the process of buying quota shares straightforward and those buying or selling quota that went through ROFO reported that it did not negatively affect the process. In contrast, there are other interviewees that have not taken the step to sign up for the ROFO program because they perceive that quota share prices are too high in relation to their financial situation or that navigating the financing and purchase of quota shares, and administrative burden associated with quota share ownership is too stressful relative to the potential benefits they associate with ownership. Irrespective of these perceptions, there were some differences in opinion between participant groups as to whether they perceived the ROFO program to be a good solution to addressing access to quota shares.

In the interviews, perceptions about the factors influencing access to quota shares related to the incentives, barriers, considerations, and financing for quota share purchases. The ROFO program is intended to create a 'market' for eligible skippers and crew to pursue quota share purchases. However, the ROFO program is not intended to directly address the quota share price component. Quota share price as a barrier to purchase was a theme emphasized by interviewees across all fishery participant categories. Many interviewees that have made or have considered making quota share purchases in the past conveyed that, with current quota share prices, lease rates, and anticipated financing costs, buyers are faced with at least a 10 year timeframe to pay off the investment. Irrespective of price as a real barrier to participants in the fisheries, it is well established in the scientific literature (Asche, Bjørndal, and Gordon 2009; Coglán and Pascoe 1999) that, where a fishery is commercialized and provide economic benefits, a competitive market for IFQ should be expected to self-regulate prices for quota shares based on vessel owners payments for labor and physical capital as well as the price that crab can be sold to

processing facilities. Given this, while this timeframe might be prohibitive for new entrants or younger fishery participants to buy into the quota market, this a loan payoff over a number of years is not unique to the crab fisheries and is naturally seen in commodities markets. In addition, it is generally expected that the majority of economic benefits produced by the fishery accrue primarily to the pool of quota shareholders. Given these expectations, barring some intervention in the market by regulators or effective voluntary measures, such as limiting lease rates or subsidizing quota share purchases in the crab fisheries, it is likely that the value of crab quota share will remain high for the foreseeable future and sales will be limited and episodic.

The interviews elicited contrasting perspectives on whether most crewmembers are candidates for investment in the fisheries through the purchase of quota shares. Several interviewees in the non-crew participant categories conveyed that they perceive a crewmember's access to credit as a barrier for them to purchase quota. If true, this may be especially problematic for a crewmember seeking financing for a quota share purchase. However, when crewmembers were asked about the barriers they perceive to purchasing quota shares, they most commonly noted high quota share prices and that they see a lack of market access. These barriers appear to each be based on the same principle, that price is affecting crewmembers' decision to purchase quota shares. The difference between the perceptions of participant categories appears to rely more on their conditional assumptions regarding the underlying cause of purchasing decisions. On the one hand quota share and vessel owners assume that credit worthiness is the biggest barrier, which is based on the assumption that crew would want to buy quota at the prevailing price. Whereas crew themselves more directly indicate that they would not purchase quota at the market price because the opportunity cost is too high, regardless of their access to credit. Given this, it is likely that crewmembers rarely get to the step of assessing their credit worthiness.

Many of the respondents conveyed perceptions about the availability of quota, and how much quota is trading hands at this point in the program's tenure. In the recent economic climate, it appears many quota owners prefer to hold their asset and lease it, rather than selling it outright (even for those who may have already sold their qualifying vessel). This suggests that quota owners regard QS holdings as superior to alternative investments and/or may anticipate a tax penalty or other transaction cost from selling the asset exceeds the costs associated with holding it and receiving a stream of lease revenues. Interviewees expressed that active participation requirements would likely induce some proportion of these individuals to sell their quota, thus, increasing the availability of quota on the market and potentially causing prices to adjust downward. Additionally, interviewees across the range of participant categories brought up the influence of differences in market power of participants and willingness to pay in the quota share market, influencing the availability of shares.

These perceptions of the quota share market coalesce for crewmembers who expressed deeper personal considerations, such as the life and career they want for themselves. Many crew indicated that they were not sure whether they wanted to continue to work on deck for the next 10 years in order to pay off a quota share investment. Respondents communicated that purchasing quota shares would be a commitment to the crab fisheries. This may indicate that crew expect to move up a lot faster than is feasible in the crab fisheries and that perhaps they do not see value in purchasing quota as a way to move up quicker. The uncertainty crew have with regards to their commitment to staying in the crab fisheries is likely why many of the crewmembers interviewed stated that they had not looked into financing options available to them for a quota share purchase. Given these perceptions, industry efforts to improve access to

the CVO marketplace may not ultimately result in many crewmember purchases of quota shares for both financial and personal reasons. In addition, as quota shares from initial recipients to the next generation of shareholders, there will likely be a regime shift as quota shareholders are beholden to make payments to banks for financed quota share purchases. This could ultimately have a negative effect on crew pay in general as the ratio of debt-financed quota shares compared to initially allocated quota increases over time.

Active participation

Discussion of access to quota shares frequently related back to discussions about active participation in the crab fisheries. A few of the passive quota shareholders that were interviewed expressed that they purchased quota as an investment or had them bequeathed, with the intention of leasing it out and collecting royalties indefinitely. Other passive quota shareholders had been issued quota initially based on their historical participation and are now retired from the fisheries and lease out their quota. This difference in how a person obtained quota shares is likely why the passive quota shareholders interviewed were split as to whether they believed that the fishery needs an active participation requirement on CVO shares. Previous NPFMC discussions on active participation focused on the latter group with the understanding that if any active participation requirements were implemented, initial allocation recipients would be grandfathered in. The impact on initial allocation recipients was one of the central points of opposition raised by interviewees that indicated quota share ownership in the fisheries should not have an active participation requirement.

The majority of interviewees in participant categories that involve physical presence on a vessel (i.e., crewmembers, skippers, owner/operators) relayed that they believe the fisheries need an active participation requirement on CVO shares. The underlying reason many respondents communicated was that under the current leasing structure, they believed most passive quota shareholders do not share in the financial risk of fishing. While the price negotiation process for agreeing on a lease rate should theoretically reflect risk sharing between the parties, this sentiment was expressed in a considerable number of interviews. Respondents' perception of inequity in these leasing arrangements related to the common practice of quota shareholders being paid a fixed share of the gross ex-vessel revenue produced from crab landed on leased quota, while vessel owner, skipper, and crew are paid a share of ex-vessel revenue, net of fuel, quota, and other operating costs. This difference is especially pronounced when expenses spike, such as during a year with higher than average ice coverage on the fishing grounds, and the financial burden is borne by the individuals fishing the quota. However, the opposite is true when expenses plummet, such as with the recent large decrease in fuel prices. The distribution of expenses is ultimately a business decision made within the context of each leasing relationship; vessel owners should incorporate perceived risk into the expected financial returns calculations used to determine an agreeable quota lease rate. However, this necessitates that leasing value is responsive to expenses on a similar timeframe and that passive quota shareholders and vessel owners have equal bargaining power. Based on the results of the interviews, it appears that these market conditions are not prevalent.

Leasing

Perspectives on leasing comprised the third central component of the interviews. The nature of this study does not allow us to evaluate the accuracy of information conveyed by interviewees or their interpretation of management objectives and their impact on conditions in quota markets or elsewhere in the fishery. With that caveat, the results of this study indicate that across participant categories, there are common perceptions that the voluntary lease rate cap measure is not being followed by everyone. It is unclear whether respondents clearly understood the objective of the voluntary measure, described by one cooperative representative as the following:

“In response to Council concerns regarding the potential effect of high lease rates on crew compensation and vessel operations, ICE has asked its members to voluntarily cap their lease rate asks and offers to 65% for BBRKC and 50% for BSS. ICE intends to have the benchmark lease rates guide negotiations among members, but because the caps are voluntary, ICE anticipates some variation around those rates.” (Sullivan 2015)

However, many respondents have expectations regarding the lease rate cap that are contrary to this objective. The lease rates caps purposefully allow for free riders and likely the interviewees’ focus on these outliers drives their perceptions of the overall effectiveness of the lease rate cap. For a voluntary mechanism such as this to be effective, incentives must be sufficient to motivate individuals to conform to the limits, and the incentive relied upon in this setting appears to be limited to social pressure within the cooperatives that have promoted the voluntary measures. Some interviewees feel that more social pressure is needed. This would help overcome economic incentives offered by the lease market. Furthermore, several respondents in these groups expressed skepticism that a voluntary lease rate could be an effective measure to address their concerns about the lease rates over the long-term. Vessel owners who hold quota shares commonly conveyed their assertion that lease rates self-regulate through the marketplace, while some interviewees referred to individuals or entities in the leasing market that have a different incentive structure related to the rates at which they make leasing decisions.

The ability of certain participants to offer higher lease rates may create an expectation for some quota shareholders as to the value that they could obtain for their leased quota, but there is no empirical evidence to support analysis of whether this has had an effect on the overall market. The cooperatives’ voluntary lease rate caps are still relatively new, having been implemented for less than two years, as of early 2015. Self-reported data on lease rates were collected for the first time in the 2013 and 2014 EDR (for fishing years 2012 and 2013) and are currently being collected again in the 2015 EDR; therefore, limited data are available to track lease rates over time. While long-term effects on the quota market cannot be assessed, median lease rates indicated by empirical data, reported by active crab vessels to NMFS for 2013 and 2014 in mandatory Economic Data Reports, show an average of 64% to 66% for Bristol Bay red king crab and 46% to 54% for Bering Sea opilio crab across all harvest quota types, and 64% and 46%, respectively, for CVO A type IFQ (Garber-Yonts and Lee 2014). In addition, the cooperatives have also reported that their members are mostly in line with the lease rate caps (Crab Cooperatives 2013). This is consistent with what respondents indicated in interviews conducted for this study, despite a frequent opinion that the intent should be to have all participants in compliance with the cap.

Irrespective of some interviewees concern with free riders and less than 100% compliance, the voluntary lease rate caps appear to be functioning as the cooperatives intended (Sullivan 2015). However, it does highlight an area of industry perception that could be targeted for outreach efforts in order to affect more lease rate agreements and prevent voluntary participation from eroding over time.

Future of the fisheries

Most individuals that were interviewed for this study held relatively pessimistic views related to the future of the BSAI crab fisheries. Most of these views centered on issues with attracting new entrants and being able to keep experienced crew in the fisheries. Many individuals focused on the barriers to entry for young fishermen who desire to get into the fishery. The costs for purchasing a vessel or enough quota shares to make entry worthwhile appear to be prohibitive unless an individual already has a foothold in the fisheries. Many individuals focused on the presence of family legacy's as well as a barrier for new entrants. Many crew as well as skippers and vessel owners that have been in the fisheries for many years do not see many options for crew to move up into the wheelhouse unless they are related to the vessel owner or have become a de facto family member through a close relation with the family that owns the vessel. This could be due in part to the significant amount of consolidation seen in the fisheries post-rationalization. With only a third of the vessels still fishing, there are a lot fewer skipper positions overall.

Given the apparent lack in pathways to ownership, experienced crew are leaving the crab fisheries. Some are moving on to other fisheries that they perceive as easier to move up in. More often than not, crab fishermen view the Bristol Bay salmon fishery as their easiest pathway. This is most likely due to the fact that salmon permits, vessels and gear are by far the cheapest to purchase of all the Alaska fisheries. The main consequence of this attrition is that crew are becoming less experienced and other participant types in the fisheries are starting to look down on crew with pejorative impressions. Interviewees talked about crew not being credit worthy with regards to their ability to buy quota. Others thought that crew do not plan for their future and are not intending to participate in the fisheries over the long term. No one is clear on what this loss will do to the crab fisheries overall, although some speculation is being made regarding a move to a daily wage system with non-professional immigrant labor.

Ultimately, however, each of these issues has been slowly leading to a 'greying of the fleet'. Individuals that have been involved in the BSAI crab fisheries since before rationalization are getting older and finding that there are few people that are experienced enough or willing to take over the fleet. This phenomenon is not unique to the crab fisheries and represents a trend that is gaining momentum across Alaska (Loring and Harrison 2013).

Areas for future research

The perspectives gathered in this study suggest areas for further targeted research on the topics of active participation, access to quota shares, and lease rates in the BSAI crab fisheries. One area would be to focus on the developing co-management structure in the BSAI CRP. The NPFMC has utilized cooperatives in several of its fisheries as mechanisms to achieve specific management goals. The main predecessor to the crab cooperatives were the cooperatives created under the American Fisheries Act for the Bering Sea pollock fishery. Since Crab Rationalization,

the NPFMC has also created cooperatives in the groundfish longline fisheries in the Bering Sea, the trawl flatfish fisheries and the rockfish fisheries in the Gulf of Alaska. For many of these cooperatives, the management goals they are tasked with achieving are biological or ecological in nature, such as bycatch reductions. The crab cooperatives have been tasked with addressing social concerns, without a clear metric of what they are to achieve. Many interviews brought up questions as to the specific measurable goals that the voluntary measures were supposed to be working towards. It would be informative to delve into the institutional characteristics of the cooperatives and their ability to define the goals they're working towards and the metric by which they are to be measured.

Another area of research that this study points to is an assessment of the transition to second-generation quota ownership in catch share fisheries. The issues of access to quota shares, lease rates, and active participation all point to concerns about how the fishery transitions to the next generation of quota owners. It is an issue all catch share fisheries that allocate quota shares face, and there is a strong collection of literature on the transitional gains trap in catch shares. It would be valuable to look at other catch share programs to see how they have facilitated or encouraged quota transfer to the next generation of owners. An important piece of information would be to measure the number of current quota shareholders that also participate in the fishery as skippers or crewmembers, and the number, or proportion of the pool, that is held by individuals who only participate in the crab fishery through the ownership of quota.

Another hypothesis to be tested is the relationship between lease rates and the percentage of the ex-vessel gross that is paid to crewmembers. The NPFMC's focus on lease rates as a mechanism for the cooperatives to address crew compensation has not been addressed in the current study. This relationship should be tested to the extent feasible. And it would be worth tracking over time to assess whether the cooperative's voluntary lease rate caps have affected the relationship between lease rate and crew pay. It is possible that if the two were related, an arbitrary lease rate cap would have the effect of decoupling the two. In general, perspectives brought up in this study suggest changes to the traditional share system in fisheries for how crew are paid.

CONCLUSION

The NPMFC's 5-year review of the BSAI CRP identified a variety of issues that it felt should be addressed, including access to quota shares, active participation, and lease rates. This study was designed to investigate the underlying influences and processes in the fisheries that affect the overall effectiveness of the industry's voluntary measures to address these issues. The results are intended to supplement and support information gathered through the fisheries' annual Economic Data Report and the NPFMC's standard public involvement process regarding how industry participants currently assess the voluntary measures. Furthermore, this study provides the first scientifically rigorous attempt at gathering a wide range of perceptions from all types of participants on the harvesting side of the BSAI crab fisheries.

Industry efforts to cooperatively address these issues through self-regulation are still nascent. The perspectives presented here are intended to broaden the feedback available to the cooperatives and the NPFMC as the measures are refined over the coming years. For many interviewees, the topics of access to quota shares, leasing, and active participation fit into a larger conversation about the future of the fishery post-rationalization. Some interviewees discussed trends they see increasing in the future with regard to the 'graying of the fleet.' Additionally,

many discussed large-scale changes in pathways to ownership and how that impacts future new entrants in the fishery. In the next phase of this project, these additional topics will be explored to provide further insight into the effects of rationalization.

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APPENDIX A: NON-RESPONSE BIAS ANALYSIS

Non-response analyses are a particularly important component of open-ended and qualitative data reporting when coding is used to quantify the qualitative results. It is important to recognize that a variety of biases could have been introduced into the qualitative data collected in this study due to non-responses. Although the project presented here was not a traditional survey where all respondents were presented with the same set of questions, the two main types of survey non-response can still be applied here. There are two main types of non-response that could introduce bias into the results of this study. In the current study, non-response bias could have been introduced based on the quality of responses that interviewees provided. Respondents often use open-ended interviews and questions to reveal negative feelings and frustration, thus referencing positive sentiments less frequently. In addition, the research topics may have been more or less interesting or relevant to each individual compared to the rest of the population. This could have affected individual decisions to participate in the study or not, their likelihood of bringing up a particular topic during an interview or responding to a question about the topic, as well as the overall quality of the responses in participant interviews. In addition, bias could be introduced by the characteristics of the individuals that agreed to participate in the study compared to those that refused or were not successfully contacted. It is important that each of these potential biases is taken into consideration when interpreting the results of qualitative studies like those presented here (Andrews 2004, Miller and Dumford 2014).

The interviewing team kept in close contact throughout the duration of the interviewing portion of the project in order to ensure that we were using definitions and interviewing strategies that were as similar as possible. We actively attempted to address potential non-response biases by encouraging respondents to provide both positive and negative responses and to elaborate on comments to the extent of their abilities. For potential refusals, we provided context to the importance of all perspectives, both positive and negative, and informed and not informed, in order to encourage as many people to participate as possible.

The potential non-response bias resulting from individuals that did not agree to take part in the study as a whole is the most quantifiable. For the purposes of this report, we conducted statistical analyses to determine if there were any measurable biases in study participation for each participant category. The purpose of this non-response bias analysis is to help guide the interpretation of the results for specific interview participant categories.

To assess non-response, several variables were analyzed for differences between respondent and non-respondent populations within each participant category. The variables that were used to test for bias differed by participant group, as the data available for each were different and potential sources of biases were different. The participant groups match those identified originally as the population frames used for initial participant contact. The categories are non-exclusive and include: quota shareholder, vessel owner, skipper, and crew. Statistical analyses were completed using the Stata software package and included two-sample t-tests with equal variances, Pearson's Chi-squared tests, or Spearman's rank correlation coefficient, depending on the type of data. Additionally, the variables selected for each participant group were input into a logistic regression model to assess any potential interaction between variables as they relate to the binary response variable (whether or not they participated in an interview). To be conservative, all statistical tests were evaluated at the significance level of $p \leq 0.10$.

Quota shareholders

To assess possible unit non-response bias, differences between respondents and non-respondents among quota shareholders were evaluated using two variables. The first was a binary variable indicating whether the shareholder was an initial recipient of quota shares or not. This variable was analyzed due to the suspected difference in motivations to discuss the interview topics, especially active participation, between those initially issued quota under Rationalization and those that had later bought into the fisheries. The second variable was the number of quota share units the individual or entity held in 2012. This variable summed quota share holdings for unique entities across share type (CVO, CVC, CPO, and CPC) and across fisheries. This variable was chosen due to potential differences in the perception of the applicability of the study to participants based on whether they derived significant income from their quota share holdings or not, which is proxied by the size of quota share holdings.

When comparing the initial allocation status of respondent versus non-respondent quota shareholders, there was not a statistically significant difference between the observed and expected values. Respondent quota shareholders were not significantly more or less likely to have been recipients of an initial allocation of quota shares in the crab fisheries (Table A1). However, when quota share holdings were assessed, the results indicated a statistically significant difference in the mean holdings of respondents as compared to non-respondents. Respondents had, on average, larger quota share holdings than non-respondents ($p \leq 0.05$; Table A2). A logistic regression confirmed this finding (Table A3). A possible explanation for this finding is that quota shareholders self-selected for participation based on the perception that the results of the study may impact them. Small quota shareholders may not feel they are affected by these issues and, therefore, may not be willing to spend the time to participate in a voluntary interview. Additionally, small quota shareholders may have affiliations with larger shareholders to whom they might have deferred their participation.

Vessel owners

The vessel owner group was analyzed for unit non-response using two variables: 2012 gross ex-vessel revenue and mean gross revenue over the period of 2005 through 2012. The mean revenue between 2005 and 2012 included a value of zero for any years a given vessel was inactive. An analysis of vessel revenue can distinguish between marginal participants and those fully invested in the fisheries. These two groups may have felt differentially inclined to participate in the study based on their participation in the fisheries. However, there appears to be no significant difference between respondent and non-respondent vessel owners when looking at 2012 ex-vessel gross revenue and the mean of 2005 to 2012 ex-vessel gross revenue (Tables A4 and A5). A logistic regression model confirmed this finding (Table A6).

Table A1. -- Pearson's Chi-squared test results for quota shareholder response and initial allocation of quota shares.

	No initial allocation	Yes initial allocation	Chi²	Prob.
Non-response	31	180	1.2481	0.264
Response	26	109		
TOTAL	57	289		

Table A2. -- Two-sample t-test with equal variances results for quota shareholder response and size of quota share holdings.

	Mean	St. Err.	N	P-value
Non-response	4426215	676974.4	211	0.0124
Response	7685642	1228611	135	

Table A3. -- Logistic regression for variables of interest for quota shareholder response.

	Coef.	Std. Err.	P value
2012 QS units held (thousands)	0.00003	0.00001	0.020
Initial allocation recipient	-0.46	0.297	0.126

Table A4. -- Two-sample t-test with equal variances results for vessel response and ex-vessel gross revenue in 2012.

	Mean	St. Err.	N	P-value
Non-response	3,098,245	568,080.6	14	0.5507
Response	3,474,471	258,260.6	69	

Table A5. -- Two-sample t-test with equal variances results for vessel response and mean ex-vessel gross revenue 2005 through 2012.

	Mean	St. Err.	N	P-value
Non-response	1,996,526	369,612	14	0.4427
Response	2,291,778	155,329.8	69	

Table A6. -- Logistic regression for variables of interest for vessel owner response.

	Coef.	Std. Err.	P-value
2012 Ex-vessel revenue (thousands)	-0.0002	0.0005	0.654
Mean ex-vessel revenue 2005-2012 (thousands)	0.0005	0.0008	0.503

Skippers

For the skipper population, four variables were used to evaluate unit non-response. The first was the number of years post-rationalization that they were a registered skipper and that they harvested and landed crab. This variable was chosen to assess any potential differences in the interviewed population between newer entrants to the fisheries as compared to those who have participated since Rationalization was implemented. To develop this variable, we started

with the registered skipper list from 2012 and determined the number of years prior that that individual skipper was active in the crab fisheries in this role. The second variable tested was a calculated ratio of skipper pay as a proportion of ex-vessel revenue. We hypothesized that there could be differences in motivations to participate in the study due to a skipper's participation on a boat with a higher or lower proportion of revenue being paid to the skipper. This variable was created using each vessel's total skipper compensation, as reported in the EDR, which was divided by estimated ex-vessel earnings for all BSAI crab fisheries derived from the CFEC gross earnings file. The third variable to assess skipper non-response was a calculated ratio of leased pounds, as reported on the 2012 EDR, to the overall poundage landed from the vessel as documented on fish tickets. This variable was selected to specifically test whether higher proportions of leased quota might have impacted individual skippers' decisions to participate in an interview. The fourth variable that was analyzed assigned skippers into stratified quartiles of 2012 median gross vessel revenue estimated from the CFEC gross earnings file. This variable was selected to evaluate whether participation on a high earning vessel as compared to a more marginal vessel in the fisheries influenced individual participation in the study. The first quartile corresponds to the skippers associated with the highest earning vessels in the fisheries and the fourth quartile corresponds to skippers associated with the lowest earning vessels in the fisheries.¹⁰ For the purposes of running the logistic regression, the quartile variable was transformed into 4 binary variables with a value of 1 representing inclusion in the quartile of interest and a value of 0 representing inclusion in any of the other 3 quartiles.

Respondent skippers and non-respondent skippers had a statistically significant difference in the number of years they had been active post-rationalization (at a significance level of 0.10) (Table A7). The skippers that participated in the study had, on average, more active years in the fishery post-rationalization than skippers that did not participate in the study (6.3 years as compared to 5.5 years). When assessed based on both the ratio of skipper pay to overall vessel earnings and the amount of leased quota pounds in relation to the overall pounds landed, there was not a significant difference between respondents and non-respondent skippers (Tables A8 and A9). The Spearman's rank correlation coefficient was significant, suggesting that there is a significant negative correlation between quartiles of vessel revenue and whether a skipper was interviewed ($N = 116$, $Rho = -0.188$, $p\text{-value} = 0.044$). Therefore, skippers associated with higher earning vessels were more likely to have participated in the study.

A logistic regression model revealed slightly different results than the four univariate tests (Table A10). When considered together, the ratio of leased pounds to overall pounds landed was significant in relation to response, as was the years in the fishery and the vessel revenue quartile variable. Skippers that did participate in the study and those that did not were significantly different when assessed based on quartiles of gross vessel revenue. Skippers from the lowest-earning vessels in the fishery for 2012 were less likely to have responded to the interview request. A pairwise correlation revealed a correlation of -0.459 between the skipper pay ratio and the leased pound ratio, which could be one of the complexities that is not captured

¹⁰ 1st quartile: greater than or equal to \$4,592,451 median gross vessel revenue; 21 vessels.
 2nd quartile: between \$3,141,428 and \$4,592,451 median gross vessel revenue; 21 vessels.
 3rd quartile: between \$1,822,608 and \$3,141,428 median gross vessel revenue; 21 vessels.
 4th quartile: less than \$1,822,608 median gross vessel revenue; 20 vessels.

in the univariate analysis, but is accounted for in the logistic regression. Therefore, the results of the non-response bias analyses suggest that the skippers that participated in the study were associated with vessels with a higher ratio of leased pounds to overall pounds landed, had been in the fishery for longer, and were associated with higher-earning vessels.

Table A7. -- Two-sample t-test with equal variances results for skipper response and number of active years post-rationalization.

	Mean	St. Err.	N	P-value
Non-response	5.47	0.36	58	0.0714
Response	6.32	0.30	53	

Table A8. -- Two-sample t-test with equal variances results for the ratio of skipper pay to ex-vessel gross revenue and skipper response.

	Mean	St. Err.	N	P-value
Non-response	0.067	0.004	60	0.303
Response	0.061	0.003	54	

Table A9. -- Two-sample t-test with equal variances results for the ratio of leased pounds to total pounds sold and skipper response.

	Mean	St. Err.	N	P-value
Non-response	0.625	0.049	60	0.261
Response	0.701	0.045	54	

Table A10. -- Logistic regression for variables of interest for skippers.

	Coef.	Std. Err.	P-value
Ratio of leased pounds to overall pounds landed	1.158	0.701	0.099
Ratio of captain pay to overall gross ex-vessel revenue	-6.287	8.922	0.481
Years in the fishery post-rationalization	0.161	0.094	0.085
Binary variable for Quartile 1	1.149	0.773	0.137
Binary variable for Quartile 2	1.462	0.765	0.056
Binary variable for Quartile 3	2.026	0.794	0.011
Pseudo R ²	0.114		
Number of observations	110		

Crewmembers

For the crew population, we used the same four variables to evaluate non-response as were used for the skipper population. The first variable was years of participation in the fisheries post-rationalization. This variable was chosen to assess any potential differences in the interviewed population between newer entrants to the fisheries as compared to those who have participated since Rationalization. This variable was created using EDR records of crew license

numbers from 2005 through 2012. The second variable was a calculated ratio of leased pounds, as reported on the 2012 EDR, to the overall poundage landed from the vessel as documented on fish tickets. This variable was selected to specifically test whether higher proportions of leased quota impacted individual crewmembers' decision to participate in an interview. The third variable tested was a calculated ratio of crew pay as a proportion of gross ex-vessel revenue. It was hypothesized that there could be differences in motivations to participate in the study due to a crewmember's association with a boat with a higher or lower proportion of revenue being paid to the crew. This variable was created using each vessel's total crew compensation, as reported in the EDR data for 2012, which was divided by estimated ex-vessel earnings for all BSAI crab fisheries, derived from the CFEC reported gross earnings. The fourth variable that was analyzed assigned crewmembers into stratified quartiles of 2012 median gross vessel revenue estimated from the CFEC gross earnings file. This variable was selected to evaluate whether participation on a higher earning vessel as compared to a more marginal vessel in the fisheries influenced individual participation in the study. The first quartile corresponds to the crewmembers associated with the highest earning vessels in the fisheries and the fourth quartile corresponds to crewmembers associated with the lowest earning vessels in the fisheries.¹¹ Some crewmembers were associated with more than one vessel for the EDR data reporting year. If this produced conflicting data points for the variables using EDR data, the highest value was taken for that individual crewmember. For the purposes of running the logistic regression, the quartile variable was transformed into 4 binary variables with a value of 1 representing inclusion in the quartile of interest and a value of 0 representing inclusion in any of the other 3 quartiles.

The difference between respondent and non-respondent crewmembers in the number of post-rationalization years worked was not significant (Table A11). When compared on the basis of crew pay as a proportion of overall ex-vessel revenue, the difference in means of respondents and non-respondents was statistically significant at a p-value of 0.10 (Table A12). Crewmember respondents had a slightly higher ratio of crew pay to ex-vessel revenue (mean = 0.160) than did non-respondents (mean = 0.144). The difference between respondents and non-respondents for the ratio of leased pounds compared to overall pounds was statistically significant for crewmembers at a p-value of 0.10 (Table A13). Crewmembers that participated in the study were associated with vessels that had a lesser amount of leased crab as a proportion of the overall crab fished on the vessel.

When evaluated using quartiles of 2012 median vessel revenue, there was not a significant correlation between response and the quartile of vessel revenue that a crewmember was associated with (N = 581, Rho = 0.0029, p-value = 0.945). The results of a logistic regression model show that considering all predictors simultaneously, the ratio of leased pounds to overall pounds landed is not significantly associated with response when other variables are considered, but whether a crewmember was associated with a vessel in the lowest quartile of revenue was a significant factor (Table A14). The logistic regression is likely a better estimate of the relationship between the variables analyzed and the response variable because it isolates the

¹¹ 1st quartile: greater than or equal to \$4,592,451 median vessel gross revenue; 21 vessels.
 2nd quartile: between \$3,141,428 and \$4,592,451 median vessel gross revenue; 21 vessels.
 3rd quartile: between \$1,822,608 and \$3,141,428 median vessel gross revenue; 21 vessels.
 4th quartile: less than \$1,822,608 median vessel gross revenue; 20 vessels.

effect of each variable while holding the other variables constant. Therefore, it is likely that the crewmembers interviewed are associated with higher earning vessels as compared to crewmembers that were not interviewed.

Additionally, it is important to note that, given that 63.3% of the crewmembers interviewed were ultimately contacted using supplemental contact information supplied by other study participants, it is possible there is a bias in the participant population of crewmembers; however, we do not have meaningful data on why individuals recommended particular crewmembers and provided supplemental contact information; therefore, it is difficult to quantitatively evaluate this.

Table A11. -- Two-sample t-test with equal variances results for crewmember response and number of years in fishery post-rationalization.

	Mean	St. Err.	N	P-value
Non-response	3.12	0.09	535	0.2655
Response	3.46	0.26	46	

Table A12. -- Two-sample t-test with equal variances results for the ratio of crew pay to ex-vessel gross revenue and crew response.

	Mean	St. Err.	N	P-value
Non-response	0.144	0.002	535	0.051
Response	0.160	0.008	46	

Table A13. -- Two-sample t-test with equal variances results for the ratio of leased pounds to total pounds sold and crew response.

	Mean	St. Err.	N	P-value
Non-response	0.658	0.016	535	0.091
Response	0.560	0.057	46	

Table A14. -- Logistic regression for variables of interest and crewmember response.

	Coef.	Std. Err.	P value
Ratio of leased pounds to overall pounds landed	-0.294	0.489	0.548
Ratio of crew pay to overall gross ex-vessel revenue	3.909	3.010	0.207
Years in the fishery post-rationalization	0.054	0.076	0.475
Binary variable for Quartile 1	0.802	0.604	0.184
Binary variable for Quartile 2	0.733	0.627	0.243
Binary variable for Quartile 3	1.273	0.584	0.029
Pseudo R ²	0.034		
Number of observations	581		

APPENDIX B: RESPONSE TABLES

Table B1. -- Non-exclusive fishery participant categories: Interviewee opinions on and perceptions of access to quota shares.

		Quota shareholder	Vessel owner	Skipper	Crew	CDQ representative	Expert respondent
N		135	52	52	48	5	10
Familiarity with ROFO	Familiar with ROFO	86	40	43	13	5	3
	Not familiar with ROFO	11	3	5	30	0	0
	Signed up for ROFO	9	4	9	1	0	0
Experience with and evaluation of ROFO	ROFO didn't negatively affect process of buying or selling quota	9	4	3	0	0	1
	Process buying quota through ROFO was straightforward	4	1	4	0	0	0
	ROFO appears to be working	14	9	5	1	1	2
	ROFO was good idea, not sure how it's working	22	7	10	1	1	0
	ROFO is not a good solution to problem	6	3	5	2	0	0
Availability of quota	Lack of quota available	45	20	26	18	2	2
	Differences in market power of participants	53	23	24	13	1	2
	CDQ groups have greater market power than others	38	17	19	9	1	1
Barriers to purchasing quota shares	Crew financial well-being	25	13	11	1	1	3
	Lack of open market for quota	18	8	12	9	0	1
	Quota price	59	33	34	35	1	2
Incentives to purchasing quota shares	If you're going to keep fishing you should have quota	4	1	5	6	0	0
	Investment piece	6	1	1	1	0	0
	Solidifying future in the fishery	9	3	7	3	0	1
Considerations in purchasing quota shares	Age and life on deck	11	6	8	5	0	0
	Complexity and stress of program	9	6	1	3	0	1
	Length of time to pay off investment	17	8	15	9	0	2
	Other investments that make better sense	7	3	3	7	0	0
	Unsure of long-term commitment to fishing	8	3	5	10	0	1
Financing quota share purchases	Issues with crew credit worthiness	10	7	6	0	0	1
	Haven't looked into financing options	0	0	0	9	0	0
	NOAA financing wasn't available at beginning	9	1	5	2	0	2
	NOAA loan program difficult to navigate	4	1	3	2	0	1

Table B2. -- Mutually exclusive fishery participant categories: Interviewee opinions on and perceptions of access to quota shares.

		Passive quota shareholder	Quota shareholder and vessel owner	Quota shareholder and owner/operator	Quota shareholder and skipper	Non-quota shareholding skipper	All crew	CDQ representative	Expert respondent
N		64	28	20	20	12	48	5	10
Familiarity with ROFO	Familiar with ROFO	28	21	17	18	8	13	5	2
	Not familiar with ROFO	9	0	1	1	3	30	0	0
	Signed up for ROFO	1	0	4	4	1	1	0	0
Experience with and evaluation of ROFO	ROFO did not negatively affect process of buying or selling quota	5	1	3	0	0	0	1	0
	Process of buying quota through ROFO was straightforward	0	0	1	3	0	0	0	0
	ROFO appears to be working	4	4	4	1	0	1	1	1
	ROFO was good idea, not sure how it's working	10	3	4	5	1	1	1	0
	ROFO is not a good solution to problem	2	1	1	2	2	2	0	0
Availability of quota	Lack of quota available	16	9	11	8	7	18	2	2
	Differences in market power of participants	19	13	9	12	3	13	1	1
	CDQ groups have greater market power than others	14	7	10	7	2	9	1	0
Barriers to purchasing quota shares	Crew financial well-being	9	7	6	3	2	1	1	2
	Lack of open market for quota	4	4	3	7	2	9	0	1
	Quota price	15	16	14	12	8	35	1	2
Incentives to purchasing quota share	If you're going to keep fishing you should have quota	1	0	1	1	3	6	0	0
	Investment piece	5	0	1	0	0	1	0	0
	Solidifying future in the fishery	1	0	3	4	0	3	0	1
Considerations in purchasing quota	Age and life on deck	2	2	4	3	1	5	0	0
	Complexity and stress of program	3	5	1	0	0	3	0	0
	Length of time to pay off investment	3	1	5	8	2	9	0	3
	Other investments that make better sense	2	2	1	2	0	7	0	1
	Unsure of long-term commitment to fishing	2	1	2	2	1	10	0	0
Financing quota share purchases	Issues with crew credit worthiness	1	3	4	2	0	0	0	1
	Haven't looked into financing options	0	0	0	0	0	9	0	0
	NOAA financing wasn't available at beginning	5	0	1	3	1	2	0	1
	NOAA loan program difficult to navigate	2	1	0	1	2	2	0	1

Table B3. -- Non-exclusive fishery participant categories: Interviewee perceptions about active participation by percentage.

		Quota shareholder	Vessel owner	Skipper	All crew	CDQ representative	Expert respondent
N		135	52	52	48	10	5
Fishery does not need additional active participation requirement	Fishery does not need additional active participation requirement	37	19	6	5	1	1
	Additional active participation requirements would negatively impact initial recipients	16	9	4	1	0	0
Fishery needs additional active participation definition	Fishery needs additional active participation requirements	52	20	34	25	2	1
	Absentee ownership in fishery is an issue	20	8	19	17	1	1
	Unequal risk sharing with QS holders	17	7	14	9	2	0
Potential active participation requirement components	Vessel ownership requirement	26	13	16	3	2	0
	Passive QS holders should not be allowed to purchase more quota	9	2	2	0	0	0
	Quota shouldn't be passed down to non-active family members	5	2	5	5	1	0
	Boots on deck	7	2	5	7	0	0

Table B4. -- Mutually exclusive fishery participant categories: Interviewee perceptions about active participation.

		Passive quota shareholder	Quota shareholder and vessel owner	Quota shareholder and owner/operator	Quota shareholder and skipper	Non-quota shareholding skipper	All crew	CDQ representative	Expert respondent
N		64	28	20	20	12	48	5	10
Fishery does not need additional active participation requirement	Fishery does not need additional active participation requirement	17	13	5	1	0	5	1	1
	Additional active participation requirements would negatively impact initial recipients	6	6	2	1	1	1	0	0
Fishery needs additional active participation definition	Fishery needs additional active participation requirements	18	7	11	14	7	25	1	1
	Absentee ownership in fishery is an issue	4	2	5	9	4	17	1	1
	Unequal risk sharing with QS holders	2	4	3	8	3	9	0	2
Potential active participation requirement components	Vessel ownership requirement	4	7	6	9	1	3	0	1
	Passive QS holders should not be allowed to purchase more quota	6	1	1	1	0	0	0	0
	Quota shouldn't be passed down to non-active family members	2	0	1	2	1	5	0	1
	Boots on deck	3	0	1	2	1	7	0	0

Table B5. -- Non-exclusive fishery participant categories: Interviewee perceptions about leasing.

		Quota shareholder	Vessel owner	Skipper	All crew	CDQ representative	Expert respondent
N		135	52	52	48	10	5
Knowledge of voluntary lease rate cap	Familiar with voluntary lease rate cap	62	30	31	9	3	1
	Not familiar with voluntary lease rate cap	11	4	6	22	0	0
Experience with voluntary lease rate cap	Full compliance with voluntary lease rate cap	39	17	12	4	2	0
	Crew being paid on cap, but lease is higher	7	5	4	0	0	0
	Majority in compliance with voluntary lease rate cap	15	8	7	1	0	0
	Less than full compliance with voluntary lease rate cap	36	21	27	10	1	0
	Voluntary lease rate caps won't solve the problem	20	10	19	17	1	0
	Marketplace should regulate lease rate	10	7	1	0	0	0
Factors affecting lease prices	Competition among vessel owners for additional quota	40	23	26	11	0	0
	Marginal gains from leased quota	12	10	9	3	0	1
	Rent seeking of quota shareholders	20	14	11	5	0	0
Leasing practices	Relationships play an important role in leasing decisions	12	8	2	0	0	0
	Has heard that some owners lease crab they own wholly back to the boat	19	8	15	21	0	1
	Owner pays crew straight up on some quota	30	17	21	20	0	0
	Newer crew less likely to see lease rates as a problem	4	1	3	8	0	0
Amount of leased crab on the vessel	All quota fished is leased to the vessel	11	7	9	3	0	0
	More quota fished is leased to vessel than quota that is not leased	14	9	13	7	0	0
	Less quota fished is leased to vessel than quota that is not leased	6	5	5	6	0	0
	No quota fished is leased to the vessel	0	0	0	0	0	0

Table B6. -- Mutually-exclusive fishery participant categories: Interviewee perceptions of leasing practices.

		Passive quota shareholder	Quota shareholder and vessel owner	Quota shareholder and owner/operator	Quota shareholder and skipper	Non-quota shareholding skipper	All crew	CDQ representative	Expert respondent
N		64	28	20	20	12	48	5	10
Knowledge of voluntary lease rate cap	Familiar with voluntary lease rate cap	22	13	15	10	5	9	3	1
	Not familiar with voluntary lease rate cap	6	1	1	2	2	22	0	0
Experience with voluntary lease rate cap	Crew being paid on cap, but lease is higher	0	3	2	2	0	0	0	0
	Full compliance with voluntary lease rate cap	18	8	8	3	1	4	2	1
	Majority in compliance with voluntary lease rate cap	4	4	3	3	1	1	0	0
	Less than full compliance with voluntary lease rate cap	5	8	10	12	3	10	1	0
	Voluntary lease rate caps won't solve the problem	1	3	3	2	1	7	1	0
	Marketplace should regulate lease rate	3	6	1	0	0	0	0	1
Factors affecting lease prices	Competition among vessel owners for additional quota	7	7	9	4	3	10	0	0
	Marginal gains from leased quota	1	3	6	1	1	3	0	2
	Rent seeking of quota shareholders	0	3	5	2	0	1	0	0
Leasing practices	Relationships play an important role in leasing decisions	4	6	2	0	0	0	0	0
	Has heard that some owners lease crab they own wholly back to the boat	4	1	4	7	3	21	0	1
	Owner pays crew straight up on some quota	4	8	7	8	6	20	0	1
	Newer crew less likely to see lease rates as a problem	2	0	0	2	0	8	0	0
Amount of leased crab on the vessel	All quota fished is leased to the vessel	0	3	4	4	1	3	0	0
	More quota fished is leased to vessel than quota that is not leased	0	4	5	4	4	7	0	0
	Less quota fished is leased to vessel than quota that is not leased	0	2	3	1	1	6	0	0

Table B7. -- Non-exclusive fishery participant categories: Interviewee perceptions about the future of the crab fisheries.

		Quota shareholder	Vessel owner	Skipper	All crew	CDQ representative	Expert respondent
N		135	52	52	48	5	10
Crew composition	Crew becoming less experienced over time	10	2	10	6	0	0
	Difficult to find good crew who will stick around	11	6	12	4	0	0
	Fishery will move to a daily wage system	9	2	9	3	0	0
	Increased use of non-professional immigrant labor	6	1	6	8	0	1
	Crew don't plan for their future	6	3	3	4	0	0
	Doesn't see a long-term future in crabbing for self	0	0	0	6	0	0
Perspectives on crew advancement	Harder for crew to become owners because of expensive quota	5	3	2	2	0	1
	More difficult to move up now because there are less boats so less opportunities	11	6	6	4	0	0
	Fishery has new entrant problem	11	8	7	3	0	1
	Pathways to move forward don't exist for most crew	17	10	14	12	0	0
	Salmon fishery has more opportunities for becoming an owner	8	7	3	10	0	0
	Takes longer to move up in fishery now because skippers stay longer in their positions	2	2	1	5	0	0
	Pathways to move up in fishery are better now	2	1	0	1	0	0
Graying of the fleet	Participants in the fleet are becoming older on average	15	10	13	4	0	3
	Crew in the fleet are becoming older on average	6	5	6	2	0	0
Family legacy	Family connections are important for pathways to ownership	4	3	3	8	1	1
	Have to be part of the family to move up in the fishery	2	2	2	8	1	1

Table B8. -- Mutually-exclusive fishery participant categories: Interviewee perceptions about the future of the crab fisheries.

		Passive quota shareholder	Quota shareholder and vessel owner	Quota shareholder and owner/operator	Quota shareholder and skipper	Non-quota shareholding skipper	All crew	CDQ representative	Expert respondent
N		64	28	20	20	12	48	5	10
Crew composition	Crew becoming less experienced over time	2	0	0	7	3	8	0	0
	Difficult to find good crew who will stick around	3	3	2	6	5	5	0	0
	Fishery will move to a daily wage system	0	1	1	8	1	3	0	0
	Increased use of non-professional immigrant labor	1	0	1	4	1	8	0	1
	Crew don't plan for their future	1	2	1	1	1	5	0	0
	Doesn't see a long-term future in crabbing for self	0	0	0	1	0	6	0	0
Perspectives on crew advancement	Harder for crew to become owners because of expensive quota	1	2	1	1	0	3	0	1
	More difficult to move up now because there are less boats so less opportunities	5	2	3	1	2	5	0	0
	Fishery has new entrant problem	6	3	6	4	4	14	0	0
	Pathways to move forward don't exist for most crew	1	4	3	0	0	11	0	0
	Salmon fishery has more opportunities for becoming an owner	0	1	1	0	0	5	0	0
	Takes longer to move up in fishery now because skippers stay longer in their positions	3	6	3	2	3	4	0	1
	Pathways to move up in fishery are better now	1	1	0	0	0	1	0	0
Graying of the fleet	Participants in the fleet are becoming older on average	4	6	4	4	6	5	0	3
	Crew in the fleet are becoming older on average	2	3	1	2	4	3	0	0
Family legacy	Family connections are important for pathways to ownership	1	2	2	1	0	9	1	1
	Have to be part of the family to move up in the fishery	1	1	2	0	0	9	1	1

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