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A Bi-Coastal Exploration of Greying of the Fleet Using Oral Histories

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Introduction

Commercial fishermen in the United States and elsewhere have consistently identified a rise in the average age of the fishing workforce (commonly called “graying of the fleet”) as a threat to the future of the fishing industry. Explanations for the graying trend are often management-focused, and indeed there is much in the literature reflecting these interpretations (Andreatta & Parlier, 2010; Rosvold, 2006; Russell et al., 2014). As such, an improved understanding of the graying of the fleet phenomenon calls for analysis that is particularly attuned to the management and regulatory contexts that impact the age makeup of the fisheries. In the case of both the West Coast groundfish trawl fishery and the Northeast Multispecies (groundfish) fishery, this context includes the relatively recent arrival of catch share management (i.e., individual fishing quotas, sectors). For this report, we set about to better understand insider perceptions of this graying trend, as well as the broader context within which it occurs, by turning to interview data collected from fisheries participants in both catch share and non-catch share fisheries on the East and West coasts of the United States. Much of this interview data is in the form of an “oral history”, which can be characterized as an open-ended interview meant to allow the interviewee to speak about what they determine to be relevant about a given topic or experience (in this case, involvement in commercial fishing, see Colburn and Clay 2011/2012). Some open-ended interview questions attached to surveys are also reviewed. The dominant themes that emerged from our analysis of these varied sources are here presented, with similarities and discrepancies highlighted where noteworthy.

Background

Aging fishery labor forces are a trend in the United States and in many parts of the world. Graying of the fleet has been consistently identified over time by fishermen in various regions and fisheries in the United States and other nations (e.g., Japan, Norway) as a threat to the future of fishing. Confronting evidence of an aging fisheries workforce and low rates of recruitment of young people into fishery-related careers, policymakers and industry stakeholders are concerned about the ability of fisheries to attract the people they need to be sustainable (AK CSHCR 18, 2012; PFMC, 2013; Russell et al., 2014).

A range of interrelated dynamics are involved in graying of the fleet. Delayed retirement (Burtless, 2013) and increased life expectancy (WHO, 2011) contribute to the structural aging of the United States workforce at large, while structural changes in fisheries such as an ongoing decline in the number of small-scale fishing operations (Andreatta & Parlier, 2010), often the largest vessel size sector and a point of entry for new fishermen, play a role in dissuading young people from entering the industry, as do shifts in the relative attractiveness of fishery-related jobs in comparison to other careers (Stimpfle, 2012; Pascoe et al., 2015). A weakening of the tradition of family succession into the fishery (Russell et al., 2014; Messick, 2015); and higher entry costs due to limited entry approaches to fishery management (Rosvold, 2006) also advance the aging trend and limit new entrants. The trends in the United States fisheries have parallels internationally (Hamilton and Otterstad, 1998; Wilhelm, 2004; Liu et al., 2011).

Extensive literature focuses on various limited entry management approaches that promote privatization or rationalization of fishing rights, including individual transferable quotas (ITQs) and other catch shares (e.g., Pinkerton & Edwards, 2009; Olson, 2011; Lynham, 2013; Fina, 2011; Holland & Wiersma, 2010; Holland & Gitner, 2001; Guyader and Thebaud, 2001; Gibbs, 2010; Essington et al., 2012; Emery et al., 2012; Criddle & Strong, 2013; Diekert et al., 2010; Criddle & Macinko, 2000; Copes, 1986; Clay et al. 2014). In response to the concerns of fisheries managers around the world that the open-access status of fisheries had led to potentially unsustainable fishing practices linked both to over-exploitation of resources and economic inefficiencies generated by over-investment, these management approaches were designed to restrict inputs of labor and/or capital in the fishing industry (Copes, 1986; Salomon et al., 2011; Olson, 2011). However, aging and limited entry issues have attracted the attention of both government (e.g., AK CSHCR 18, 2012; Liu et al., 2011; MAF, 1995; Yagi, 2006) and industry (e.g., Nelson, 2014; Russell et al., 2014; Watanabe, Saeki, Takahashi, & Hasegawa, n.d.), some of whom see them as potential threats to the future sustainability of fisheries (though limited entry and catch shares were introduced as sustainability measures and have performed that function by other criteria (Smith and Clay 2010). The level of policy engagement on this issue has increased as fishermen in regions with both catch share and non-catch share fisheries call attention to the aging workforce as exacerbated by the fleet consolidation associated with catch share programs (Taipei Fisheries Agency, 2006; Russell et al., 2014, Bennken et al., 2016). Changes in permit ownership and business models all directly influence

social and economic systems within communities (e.g., Crosson, 2015); thus, it is important to examine the implications of fisheries policy for fleet age demographics.

After a thorough analysis of interviews collected, our data suggest similar findings to the themes of fisheries aging literature. Further discussion of these findings are described below and include: the declining numbers of next generation fishermen, impacts to communities, aging of people and vessels, and impacts of catch share management on both the age of the fishing workforce and the ability of fishermen to adapt to management changes. Our findings, mirroring the literature, showed the aging trend was perceived as significant within the commercial fishing industry on both the East and West coasts and across all fisheries represented within our sample. Fishermen's attitudes varied on whether they would encourage the next generation to enter the commercial fishing industry. While some spoke of a lack of opportunities, especially in groundfish catch share programs, other fisheries saw young people entering the industry, e.g., the New England scallop fishery and the West coast crab fisheries. Within the literature and our data, fishermen involved in both catch share and non-catch share fisheries are resilient and adaptive despite a continuously changing industry. Whittle (2016) described the tenacity of fishermen in the Rhode Island lobster fishery, the New England cod fishery, and the Mid-Atlantic surf clam fishery as they adapt to changes. Fishermen who have chosen to continue in the fishery have made adjustments in their fishing business, which in many cases involves accepting less income. For example, anthropologists have argued that job satisfaction is often more important than income to fishermen (Acheson et al. 1980; Gatewood and McCay 1990). Sometimes, fishermen actually subsidize their desire to fish with other income and tend to emphasize the benefits of fishing over the costs (Anderson 1980; McCay et al. 1993; Smith 1981).

Methods

We drew upon a variety of sources: the NEFSC oral history database, the NMFS Voices from the Fisheries collections, various West Coast oral history collections, and semi-structured interviews conducted as part of the Pacific Coast Groundfish Trawl Fishery Social Study (PCGTFSS). The interviews ranged in date from 2004-2015. The decision to include PCGTFSS data was made as a means of evening out the East/West composition of the interviews for comparison purposes; at present, the East Coast oral history collection is more extensive than the West Coast collection. Oral histories and semi-

structured interviews were selected from these sources based on whether the discussion within was concurrent with the researched themes of graying of the fleet, i.e., discussions of the younger generation, management difficulties, and industry members getting older. The PCGTFSS semi-structured interview sample were asked specifically about their thoughts on the graying of the fisheries.

This ultimately yielded 203 interview documents from United States commercial fishing industry participants on the East and West coasts: 106 East Coast oral history interviews, 36 West Coast oral history interviews, and 60 West Coast semi-structured interviews¹ from the 2010 (n=29) and 2012 (n=31) iterations of the PCGTFSS. Of interviews for which we had associated fishery involvement data (n=145) the majority were from participants in the regionally-managed groundfish fisheries on each coast, each of which was transitioned into some form of catch share management in 2010. The presence of a sizeable non-groundfish participants in the sample, however, gave us the ability to compare findings across fishery involvement, thus helping to tease apart “graying” (see Appendix I age data) brought about by catch shares management as opposed to other variables such as fishery participation and industry role (see Appendix II through V).

Once compiled, the interviews were divided between three researchers. Using grounded theory (Glaser and Strauss, 1967) and classical content (Wutich et al., 2015) approaches, we began by summarizing 40 oral histories completed in the Northeast on the groundfish catch share fishery. From this initial review, we developed a broad first round of codes that were based largely on themes that emerged from these 40 oral histories, but augmented by themes and findings from literature on graying and catch share management. We next separately coded these 40 interviews, using MAXQDA, a qualitative text analysis software (see Appendix VI for code book). We then measured *inter-coder reliability*, or the degree to which each individual researcher’s coding of a common text aligns with that of other coders (Ryan, 1999). Based on this assessment, we then discussed, revised, and augmented our coding scheme to make sure all researchers’ understanding and usage of the codes was similar. Once 80% inter-coder agreement was reached, these codes were then applied to the rest of the interview

¹ These same semi-structured interviews were previously analyzed for a general “greying of the fleet” theme in one section of Russell et al. 2014. On occasion we will reference this analysis, but the reader should keep in mind that though this is a separate greying analysis, its semi-structured interviews are common to both studies. This study also includes additional oral history data. And Russell et al, 2014 contains sections on both interview and survey data on a variety of topics.

collection. A second round of coding included sub-codes that captured a subset of our initial broad themes on a more fine-grained level was then completed, again with inter-coder reliability established.

The research team then formulated several theme-based questions for analysis (Appendix VII). Framing our analysis with these questions, we organized the interview documents into variable-based “sets” in order to look for differences in content between various sub-groupings. The results that follow can be seen as an exploration of the major themes that emerged from our coding and analysis, with variable-based differences highlighted where applicable.

Findings

Graying of the Fleet

Research done on both the East and West coast has shown an increase in the average age throughout time. Seara et al. (2016) present a unique temporal comparison on job satisfaction among fishermen collected in three time periods: 1977, 2009/10, and 2013/14 in Point Judith, RI and New Bedford, MA, two New England fishing ports. Results showed a considerable increase in average age: Point Judith, RI fishermen increased from an average age of 33.9 to 45.2 and New Bedford from 35.1 to 46.1. Between the 2009/10 and 2013/14 study, the average fisherman age in Point Judith went up from 43.7 to 45.2 and in New Bedford from 44.2 to 46.1. Similarly on the West Coast, a strong distribution of both quota and vessel owners in the 51-60 years-of-age decile was found in the 2010 results from NMFS’s Pacific Coast Groundfish Trawl Fishery Social Study and between 2010 and 2012, the percentage of groundfish trawl fishermen 61 years old or older increased from 22.5 percent to 27.2 percent, while the percentage of groundfish trawl fishermen 30 or younger fell from 10.4% to 5.8% during the same period (Russell et al., 2014). In Alaska in 2011, there were twice as many Alaska permit holders between 45 and 60 as there were between 30 and 44 (Cannon & Warren, 2012). Moreover, aging of the Alaskan fishery workforce has been noted for some time (Donkersloot, 2015) and census data indicate that between 1980 and 2013, the number of Alaska residents under 40 years old holding fishing permits fell from 38.5 percent to 17.3 percent of the total number of permits.

Fishermen within our study were conscious of the aging fleet and frequently discussed the topic as being an issue threatening the future of the fishing industry on both the East and West coasts. As one

fisherman in California states: “In this port I was the youngest skipper when I started running the boat, I was 18. I am still the youngest skipper at 43.”

The first round of coding captured those interviews that had any mention of an aging industry. A second round of coding captured those that discussed “aging people” vs “aging vessels.” A distribution of how many oral histories mentioned aging people at least once, as well as how many mentions it received total, is shown in table 1 below. The code table shown here, and all code tables throughout the report, are categorized by *Catch Share Fisheries*, *All other fisheries*, and *Other*. Catch share fishermen include any owners, captains, captain/owners, or crew of the East Coast’s Northeast Multispecies (groundfish) fishery and the West Coast Groundfish Trawl Fishery (See Appendix III for all role/positions of fishermen). For the East Coast, the majority of oral histories within this category were taken from the Catch Shares Oral History project and on the West Coast from semi-structured interviews in the NMFS’s Pacific Coast Groundfish Trawl Fishery Social Study. The “All other fishermen” category includes oral histories completed prior to catch shares for groundfish as well as for other fisheries outside of catch share management. The “Other” category includes oral histories and interviews from shore support, wives, and anyone that could not be identified by fishery or role in the industry.

Table 1: Distribution of the code "Aging people" for the East and West Coast separately and overall

Sub- group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
Catch share fishermen	22	10	45%	21
All other fishermen	44	19	43%	35
Other	40	11	28%	15
<i>EC overall</i>	<i>106</i>	<i>40</i>	<i>38%</i>	<i>71</i>
WEST COAST				
Catch share fishermen	29	15	52%	24
All other fishermen	7	2	29%	3
Other	61	25	41%	46
<i>WC overall</i>	<i>97</i>	<i>42</i>	<i>43%</i>	<i>73</i>
TOTAL OVERALL	203	82	40%	144

of interviews: The sample size of each sub-group.

of interviews with mention: The number of interviews which a code occurs at least once.

Mention rate: The percentage of the sample size that mentioned a code at least once.

Code Segments: The number of code mentions total for each sub-group.

Catch share fishermen presented the highest mention of aging workforce with 45% for East Coast and 52% of West Coast as shown above. All other fisheries outside of catch share management or before catch shares were implemented were also shown to have a high mention rate of an aging workforce on the East Coast.

An indicator of an aging population can also be seen through health insurance availability. Fishermen on the East Coast who had the opportunity to receive health insurance through programs for fishermen have had to find other means because of an aging fleet:

“The health insurance...last year, after they...they dropped us. The Commercial Fishermen’s Partnership dropped us ‘cause the average age of the fishermen was 52 years old. So they said we...that they couldn’t have it anymore.....” – Massachusetts fisherman

Aging vessels were also discussed by respondents on both coasts. Fishermen as well as shore side support participants mentioned the problem of fishermen not having enough money to invest in a new vessel.

“The aging fleet, the average age of the boat in this port, I shouldn’t say the average, the newest among the newest boats in this port were built 25 years ago. For a steel boat that is starting to be old, and then even the best maintained when you get to that age...We have to hope that allocation (sic) increase and profits increase to a point that we can start thinking about a newer fleet and what that says to safety and that type of thing.”
–Rhode Island fisherman

The topic of aging in fisheries is studied in other parts of the world as well. A survey by Al-Oufi, McClean & Palfreman (2000) found that 64 percent of Omani fishermen were between 41 and 55 years old, while only 4.6 percent were in the 26 and under age-group. An earlier survey had found the average age of all Omani fishermen was 35 years old (University of Durham, 1978). Al-Marshudi & Kotagama (2006), looking at these Omani data, attributed the difference from 1978 to 2000 to aging of current fishermen and fewer young people entering the occupation. They explained that as the older generation of Omani fishermen retired or left the fishing industry, the total number of fishermen declined because the younger generation appeared to have considerably less interest in fishing as an occupation. Similar situations have been described in the US Pacific Groundfish Fishery (Russell et al., 2014) and the small-scale commercial fisheries of North Carolina (Andreatta & Parlier, 2010). In our research too, when discussing the topic of aging, many commented on the lack of young people entering the industry and their concerns for the future of the fishing industry without a new generation.

New entry/ next generation

Barriers to entry

The overarching theme that emerged from the “Next Generation” code on both coasts was the current cost-prohibitive nature of the industry, which impedes new fishermen from entering the commercial fishing industry. The most common responses from fishermen in all fisheries in relation to the next generation suggested that in previous decades it was easier to enter the industry with a smaller vessel and eventually work up to becoming a skipper or owner, due to the low cost of entry. Particular to the groundfish fishery on both coasts, it was repeatedly mentioned that since the implementation of catch shares management the initial investment of establishing a small independent fishing business, coupled with the limited access nature of the groundfish permits, has made entry to the industry nearly impossible. Groundfish fishermen interviewed on both coasts since 2010 (i.e., those fishermen under a catch share regime) overwhelmingly described this barrier to entry as resulting from the implementation of catch shares management. Russell et al. (2014) found that while there were a few study respondents who believed that the Pacific Coast Groundfish fishery was still accessible to new entrants, most fishermen stated that it is very difficult for new entrants to acquire the financial capital needed to enter the Groundfish fishery; this affirms our assessment of the West coast semi-structured interviews for which some of the data used was overlapping and therefore not reported separately. Discussions held in the Commercial Fisheries Programs Committee meeting for the Alaska State Legislature similarly describe young people as facing “much higher hurdles” than the initial recipients of commercial fishing entry permits with regard to financing, as the cost to enter fisheries on a diversified level sufficient to provide a “satisfactory” income for a skipper and crew exceeds \$350,000 (AK CSHCR 18, 2012).

More generally, the need for entry opportunities for new people has been explicitly expressed in some of the literature on limited entry management approaches (e.g., Rosvold, 2006; Langdon & Springer, 2006; Russell et al., 2014). Others, similarly, describe the use of ITQs and other catch share programs in fisheries as making entry prohibitive for young people who may have an interest in joining (Volz, 2005; Christensen, Hegland & Oddson, 2009) or speak more generally about the opportunities or lack thereof for new entrants into the fishery (e.g., Pinkerton & Edwards, 2009; van Putten & Gardner,

2010; Lynham, 2014). It is also important to avoid assumptions that “new entrants” is always synonymous with “young people” (e.g. Volz, 2005).

Interviews used in our study suggest that encouragement to enter the commercial fishing industry was not strong, particularly on the East Coast (Table 2). This is consistent with the trend found in the Seara et al. (2016) study on the changes in job satisfaction over time in New England. Further our interviews also frequently suggested that generational fishing is not as common now, due to the volatile conditions of the industry, such as changing regulations and unstable income. Only a few participants on each coast mentioned they were able to pass their business on to their kids. Yet, on both coasts industry members said the only way a new generation of fishermen would have an opportunity to join the industry was if they were born into a generational fishing family:

“To get into the business today you have to be a millionaire. If you weren’t lucky as I was to take over my Dad’s business and work the boat and gain quota and everything else, I mean for someone to get into the business there’s no chance, and that’s unfortunate. I just wish everyone could have a chance; it’s just a great way of life.”
-Massachusetts Fisherman

“ Now, even the smaller tiered trawl boats, I think probably hold a billion dollars’ worth of quota and unless you're a direct descendent or, you know what I mean, or you have a million dollars to drop on it or somebody's going to co-sign for you or whatever. Like I said, the entry-level is just not there.”
-Oregon Fisherman

A great number of sociological and anthropological studies describe commercial fishing as a family enterprise and an ‘occupational culture,’ passed on through generations of fishermen (Norr and Norr, 1974; Davis, 1986; Pollnac, 1988; Poggie et al., 1995; Reed et al., 2013). A change in this practice is significant.

Table 2: Distribution of the code "Would not advise young people to enter fishing" for the East and West Coast separately and overall

Sub-group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
Catch share fishermen	23	16	69%	26
All other fishermen	44	24	54%	41
Other	39	20	51%	32
<i>EC overall</i>	<i>106</i>	<i>60</i>	<i>56%</i>	<i>99</i>
WEST COAST				
Catch share fishermen	49	12	24%	19
All other fishermen	11	3	27%	3

Other	37	8	21%	12
<i>WC overall</i>	97	23	23%	34
TOTAL OVERALL	203	82	40%	144

While there is potential opportunity for younger people to enter the industry through an established family business, several participants noted that banks no longer fund independent commercial fishing businesses due to the uncertainties of the industry. The lack of institutional financial backing adds to the difficulty for a young person not born into a fishing family to acquire the financial backing necessary to establish an independent commercial fishing business. Most new entrants simply do not have the startup capital needed to buy a boat, a trawl permit, and quota share (Volz, 2005; Russell et al., 2014; Weiss, 2016; cf. Joling, 2016). This creates an issue of who is going to replace the current fishing workforce as it ages and retires.

Perceptions of the younger generation

Low recruitment into fisheries is also sometimes due to a perception that the industry is shrinking or perhaps dying (e.g., Nelson, 2014; re. Seara et al. 2016 on declining job satisfaction). Overall, perceptions of the younger generation of potential new entrants focused on the lack of interest in fishing due to the unstable nature of the industry. Relative attractiveness of fishery-related jobs in comparison to other careers (Stimpfle, 2012; Pascoe et al., 2015) plays a role in dissuading young people from entering the industry. It was also noted several times that there was a larger societal shift toward higher education (re. CITE LIT HERE) . Contemporary fishing communities conform to many of the classic patterns found in migration research on rural-to-urban population flows (e.g., Donkersloot, 2006; Hamilton & Otterstad, 1998; West & Hovelsrud, 2010; Donkersloot & Carothers, 2016). Young people, especially those with more education, are the most likely to move. Donkersloot (2006) found that students who graduated high school in Bristol Bay, Alaska prior to the 1997-1998 fisheries crises showed high levels of out-migration, suggesting a strong preference for living outside of the community despite favorable fishing years. Interview data indicated that most young people in this study did not find long-term life in the community appealing (Donkersloot, 2006).

Interviewees on both coasts said that the younger generation is not capable of the physical nature of the work. Fishing is known to be a physically hazardous and demanding activity (e.g., Neutel,

1990; Schilling, 1966; Cadenhead, 1976, Reilley, 1985; Yu, 2001; Liu et al., 2011; Kodiak, 2014). In Japan, according to Wilhem (2004), fisheries labor is described as a “3 K” job. The K’s stand for kiken (dangerous), kitsui (hard), and kitanai (dirty). Yu (2001) asserts that people are less willing to work on fishing vessels because the working environment is hazardous and fraught with risk; as a fisherman from California states:

“I don’t think they can do it. It is a lot of allure... and then when they go out there, they go on the ocean and it’s not that easy.”

Within the oral histories, many people noted that despite the need for new employees to keep the industry alive, many young people, “don’t want to get into it...seeing the way things are, do they really want to get into it? Why would a kid want to do that?” – Rhode Island Fisherman’s Wife

Younger generation involvement

Many fishermen observed not seeing any young people in the industry, despite the need for new employees to keep the industry alive:

“There’s no young blood getting into it, so...you know. Young kids don’t want to get into it. And then, seeing the way things are, do they really want to get into it, you know? Not exactly thrilled with the way things are, so why would a kid want to do that?” –Rhode Island Fisherman’s Wife

While the presence of the next generation was rarely observed, there were a few cases of next generation involvement in fishing at the time of interviews on both coasts. There were fishermen whose children were in the industry—though in some cases it was part-time or seasonal work. On the East Coast it was specifically mentioned a few times that young people were involved in the lobster and scallop fisheries because there were more opportunities, while on the West coast it was observed that younger people gravitate toward the crab and shrimp fisheries because they were more accessible than the groundfish fishery. Shown in Table 3 below, it was suggested on both coasts that there was a need for the next generation of workers in the groundfish fishery; while all other fisheries on both coasts have a younger workforce.

Table 3 Distribution of the code "Young people are involved in fishing" for the East and West Coast separately and overall

Sub-group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
Catch share fishermen	23	8	34%	19
All other fishermen	44	21	47%	48
Other	39	22	56%	55
<i>EC overall</i>	<i>106</i>	<i>51</i>	<i>48%</i>	<i>122</i>
WEST COAST				
Catch share fishermen	49	19	38%	31
All other fishermen	11	8	72%	19
Other	37	25	57%	59
<i>WC overall</i>	<i>97</i>	<i>52</i>	<i>53%</i>	<i>109</i>
TOTAL OVERALL	203	103	50%	231

The corporate business shift reduces opportunities

It was noted on both coasts that the shift away from small independently-owned businesses and generational fishing to a corporate or big business model has greatly reduced, if not eliminated, the opportunity for a young person to establish their own fishing business. Changes in permit ownership and business models, and in employment practices, all directly influence social and economic processes in communities (e.g., Crosson, 2015) and therefore fleet age demographics. Several interviews on both coasts mentioned it would take about US1 million to enter the commercial groundfish fishery. Participants on both coasts saw the commercial fishing industry as going the way of farming; from a small family-owned business to large corporations buying out family-owned operations. On both coasts the corporate trend was also compared to the trend seen in the lumber industry:

“A lot of people in this town have relatives and grandfathers and the whole fishing industry here is engrained, as much as logging into this community and to watch it just get wiped away and be left to big business, I mean it’s a shame.” -California Fisherman

“Where in our culture today do you have this picture of the independent man forging his way through the world? We destroyed the family farm. It may have a resurgence and we hope for that. The timber barons have changed the whole dynamic in harvesting wood.” -Massachusetts Fisherman

The shift toward a corporate business model results in consolidation of the fleet, which is discussed in detail later in this report. The barrier to entering the industry and eventually become an owner is a threat to the current character and diversity of the commercial fishing workforce.

Crew

Quality of crew

While there are fewer crew opportunities due to consolidation of the fleet and financial inability to hire new crew, captains and crew are aging and will need to be replaced in the near future. However, the dearth of new crew willing to put in the time and effort to really learn the ropes means there are few crew adequately trained to fill these future positions:

“Boats were small. There was tremendous pride. Crews and you had to know your stuff. You had to really pay attention. You were lucky. It was difficult to get on good boats. The opportunity now, is that they are a dime a dozen and even if you get that, nobody cares about anything. There is no pride. That is one of the reasons that I want out. I’m tired of dealing with misfits. I’m really, really tired of it.” -Rhode Island Fisherman

“The way it was before the catch share program was easier to find crew... I mean. I can't... I had a guy quit me in probably April. I can, I can't hardly replace him... because nobody's coming into fishery anymore. This fishery is dying, I mean literally goin' away.”- California Fisherman

The implementation of catch shares management on commercial fishing resources has had wide-ranging consequences for less powerful segments of the fishing industry, in particular crew (Guyader and Thebaud, 2001; Olson, 2011). Crew labor is historically a common point of entry for vessel ownership. However, in the halibut fishery ITQ system in British Columbia, Canada, for instance, the costs of permit leasing were passed on to crew, who could least afford to bear it (Pinkerton & Edwards, 2009). Where crew received 10 to 20% of the catch value before ITQs were implemented, they received 1 to 5% after implementation, despite increases in the value of the halibut fishery (ibid.). Similarly, the practice of subtracting a lease fee from the amount to be divided among the crew in advance as a trip cost, even if a fisherman-skipper owns the quota (and thus pays the lease fee to himself), has been described in literature for both the British Columbia halibut ITQ system and the U.S. surfclam ITQ system (Pinkerton & Edwards, 2009). Crews are thus working for reduced wages, making it more difficult to save up for a vessel of one's own and exacerbating the perception among young people that fishing is not lucrative. So fewer young people enter and fewer crew are willing to stay in the fishery. The resulting high attrition rate over time for crew that has been observed on both coasts has raised concern for the future of the industry.

Crew leaving fishing

Our group of interviews suggest business owners were not able to afford the overhead of new crew due to the uncertainty of fishing as a source of stable income, which made the few opportunities available unappealing to potential new recruits. Sixteen percent of West Coast respondents in our collection mentioned crew leaving, while 29% of the East Coast interviews cited crew or the inability of crew to make an adequate living. Cannon & Warren (2012) described a high incidence of crew members from Alaska in their mid-30's through older age ranges, attributing the shift to aging crew eventually purchasing their own permits. Other investigators have a distinctly less optimistic outlook on the seemingly natural progression from crew to operator to owner. Crew members often do not make enough money to work their way up the back deck (Binkley in Neutel, 1990; Copes, 1996; Phillips et al., 2002; Russell et al., 2014). Older fishermen lament that with little or no chance for advancement in their work, the younger generation (those 25 and under) cannot realize the vision of one day becoming boat owners and captains (Carothers, 2006). This is, often but not always, related to the implementation of limited entry or catch shares programs, as a fisherman involved in a catch shares provided an example of crew leaving:

“The boats that aren't working, you know, because they're selling their quota, if the crew's not working, so you've got those people looking for work doing something else” –Massachusetts Fisherman

Non-catch share fisheries are also experiencing crew leaving, *“It's been tough to hold a lot of crew mates, crewmembers, because a lot of the fisheries regulations keep our incomes at a level that it is not really beneficial to have a crew mate”* as fisherman from Massachusetts describes.

Consolidation

Industry participants on both coasts talked about consolidation in relation to roughly two main aspects of commercial fishing: consolidation of the fleet and consolidation of shore-side support businesses (including processors).

Consolidation of the fleet

Explanations for fleet consolidation on the East and West Coast were sometimes varied, but more often than not management actions were at their core. Previous vessel and permit buy-back programs were identified as having major (mostly negative) ramifications for businesses in fishing

communities. Many, especially those of the older generation, also trace the consolidation trend to the introduction and spread of limited entry management in US fisheries. Despite the fact that directly operating under ITQ management was still relatively new for the vast majority of the sample, it too was seen as tied to fleet consolidation. The added expense of permits, vessels, quota (buying and leasing), observer coverage, and a lack of an owner-on-board provision, were among the ITQ-based contributors to fleet consolidation discussed by participants on both coasts, a finding which mirrors the literature (Benneken et al., 2016; Volz, 2005). These factors, along with the more longstanding factors like buybacks and limited entry, contribute to consolidation by forcing boats (usually smaller ones) out of the fishery, often leaving their permits and quota to the highest bidder. Participants on each coast offered predictions for future consolidation of the industry that echoed the following quotes:

“If you had to design the perfect avenue to get to a monopoly, to monopolies, sectors is exactly how you would do it. You’d say, OK, we’re going to cap everybody in at these small numbers that they’re not able to survive on, the only viable answer is for them to sell out to big enough groups that can stack it all into one pot and work from there, which happens in New Bedford, Gloucester.” – Rhode Island captain

“Who is going to buy the fish? I mean either another fisherman is going to buy my fish, but then who is going to buy it if he can’t pass it to his kids, who is going to buy this stuff? It’s going to all end up in the hands of a half a dozen people in 20 years.” – Oregon owner/operator

Consolidation of shore-side businesses

Industry members on both coasts spoke about not only consolidation of the fleet, but also of processing plants, fuel suppliers, boat yards, mechanics, gear shops, and other shore-side support businesses. Interviewees on both coasts mentioned that many of these businesses in their communities have closed, and that a small number of hub ports now provide these services for the entire coast(s). Our discussion of community health in the following section will provide more insight into the issues faced by shore-side support businesses and infrastructure.

Table 4: Distribution of the code "consolidation" for the East and West Coast separately and overall

Sub- group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
Catch share fishermen	22	16	73%	45

All other fishermen	44	20	45%	65
Other	40	17	43%	50
<i>EC overall</i>	<i>106</i>	<i>53</i>	<i>50%</i>	<i>160</i>
WEST COAST				
Catch share fishermen	44	21	48%	50
All other fishermen	11	5	45%	16
Other	42	19	45%	49
<i>WC overall</i>	<i>97</i>	<i>45</i>	<i>46%</i>	<i>115</i>
TOTAL OVERALL	203	98	48%	275

The relatively high mention-rate of consolidation among catch share participants on both coasts points toward a link between catch share management and heightened perception of the presence and threat of consolidation. Notably, this concern is highest on the East Coast. Many East Coast fishermen felt they had been forced into sector management and that sector management favors corporate fishing interests over the “little guys”. While more prevalent on the East Coast, this sentiment was expressed by West Coast fishermen as well.

“You go into New Bedford, Newport, Point Judith, some of the bigger ports, there’s guys that own fifteen or twenty boats. What’s it to them to just buy out another one of these small businesses, take over their fishing, maybe just get rid of the boat, just take their fishing rights, their quota and stuff. That’s my biggest concern with the sectors stuff is I don’t see any stop to the consolidation of it. I just see it turning into four companies on the east coast that own the entire fishing industry.” – Massachusetts fisherman

“It’s kind of given processors and other companies’ opportunities to not only process the fish, but own the quota and own the boats and so pretty soon instead of being fishermen owned small businesses that are owned by families it will just become corporate-owned boats and quota and processors will just be company-owned fishing.” – Oregon fisherman

Consolidation and graying

As regulatory and market forces steer the East and West Coasts’ groundfish fisheries toward greater consolidation, many participants expressed concern over the accompanying decline in market space for small-scale fishing operations. The struggles and disappearance of existing small-scale operations, and the subsequently diminished opportunities for potential new entrants, were two common reasons cited for this concern. As reflected elsewhere in the literature, aspiring new entrants—including young people—must overcome significant financial hurdles in order to join catch share managed fisheries, and for many these hurdles are too simply too high (AK CSHCR 18, 2012; cf. Joling, 2016; Russell et al., 2014; Volz, 2005; Weiss, 2016). This in turn leads to further corporatization in the fishery, as outside investors and large-scale operations are able to leap over financial hurdles that others

cannot (Donkersloot, 2015; Donkersloot & Carothers, 2016; Messick, 2015). Financial concerns relating to family-run fishing operations were also brought up (i.e., costs too high to viably transfer business within the family), impacting generational transfers and leading to greater corporatization of the fisheries.

“No, well that’s about, I mean my son kinda wants to keep fishin’, you know. But the thing is I mean, I don’t have enough money to say, “Here’s my whole operation.” I mean I’m gonna have to sell my operation to retire. You know, I don’t think he could make it. If I worked up a loan for him, you know, on my business and sold him the business, even with no money down I don’t think he could make the payments. It’s just, it’s not there. It’s not there in my mind so I don’t see how he could do it any different than I am. You know. So what’s gonna wind up happening is a lot of guys like myself are gonna wind up sellin’ to who, the big companies, you know corporations and whatnot. You know and it’s disheartening that, you know, as Alan Jackson says, “There goes another little man”, you know. I mean it’s just on and on and on. And pretty soon corporate America, you know instead of being 99, the 99% and the 1% it’s gonna be...” -California owner/operator

The link between consolidation and “greying” of the fleet is such that participants on both coasts seem to see them as inseparable phenomena. Many of the forces identified as causes of consolidation, such as increased starting and operating costs, restrictive management, and unequitable regulations, were also identified as influencing “greying” via the barriers to entry they form. This finding is not news (see Benneken et al., 2016; Christensen, Hegland & Oddson, 2009; Pinkerton & Edwards, 2009; Lynham, 2013), but the fact that consolidation and greying are perceived to be so linked on *both* US coasts is nonetheless striking.

Community Well-being

Participants in our sample frequently reflected on the health and viability of their fishing communities. “Fishing community” was rarely defined explicitly, but discussion often centered on the city, township, harbor, or port in which one lived and/or participated in commercial fishing. These communities ranged in size and level of fisheries dependence, as well as fishery specialization(s). Common issues—and ways of framing the issues—were apparent, despite this variation.

Overall, participants operating in a catch share managed system spoke more frequently about their concerns for the well-being of their communities than those that were not involved in such a fishery. In addition, East Coast interviewees more often expressed concern about the status of fishing communities than did West Coast interviewees, a difference reflected in the “health and future of fishing communities” code breakdown table below.

Table 5: Distribution of the code "health and future of fishing communities" for the East and West Coast separately and overall

Sub- group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
catch share fishermen	22	20	91%	148
all other fishermen	44	23	52%	91
Other	40	21	53%	65
<i>EC overall</i>	<i>106</i>	<i>64</i>	<i>60%</i>	<i>304</i>
WEST COAST				
catch share fishermen	44	23	52%	43
all other fishermen	11	4	36%	14
Other	42	27	64%	68
<i>WC overall</i>	<i>97</i>	<i>54</i>	<i>56%</i>	<i>125</i>
TOTAL OVERALL	203	118	58%	429

Overall, discussion of issues related to community well-being occurs at similar rates on each coast (East Coast = 60%; West Coast = 56%). On the East Coast, however the high mention rate among catch share participants (91%) is quite striking. Relative to the other sub-groups, catch share participants on the East Coast appear to show a greater level of concern for the well-being of their fishing communities, an indication of catch shares' perceived negative impact on coastal community health. We see a similar pattern on the West Coast, in that catch share participants discuss community well-being more frequently than other fishermen do, but the mention rate for the "other" category is the highest among West Coast sub-groups. This is likely due to the fact that there are many shore-side support business owners and employees within this sub-group, and these participants' perspectives tended to center around the ways their business—and by extension, the community at-large—were impacted by changes in the fishery.

Diminished sense of community

Interviewees from both coasts spoke about a divide between the "haves" and "have nots" in the catch share managed fisheries in which they participate, with the "haves" being those who were allocated (or had means to attain) a sufficient amount of quota to maintain a viable groundfish fishing

operation, and the “have nots”, who were not allocated (or able to obtain) enough groundfish quota to viably continue to prosecute the fishery. This division among fishermen was more of a point of concern on the East Coast than the West Coast, although it can be seen as one element of a changing (and often diminishing) sense of community that participants on both coasts described. The following quote illustrates this impact of catch shares:

“There is a very distinct divided way of the ‘haves’ and the ‘have nots’. And the ‘have nots’ and the people that were screwed, and they were screwed. The people that ‘have’ are willing to fight to keep what they have and to continue to take more of what we have and it has created quite a bit of problems in the community. Not to say the community didn’t have this tension with certain other people, but you used to be able to row them around and go to any harbor, but now, no. There are people that won’t come to our harbor, and people in our harbor that won’t go to other harbors.” – Massachusetts fisherman

Loss of shore-side businesses and infrastructure

A loss of shore-side commercial fishing-related businesses and infrastructure was one of the most readily apparent themes that came up when industry participants in our sample discussed the status of their fishing communities. Interviewees linked these losses directly to management changes designed to limit fishing efforts, particularly those that have done so by downsizing the fleet. Varying degrees of negative impact to fishing businesses and infrastructure were attributed to catch shares management in the groundfish fisheries, with the rise of limited entry management strategies, as well as various buy-back programs, also being attributed varying levels of causal force. Regardless of the cause identified, informants overwhelmingly linked decreased fleet presence with decreases in profits for the shore-side businesses with whom vessels have economic relationships—a decrease which, in some cases, has led (or is leading) to businesses closing up shop.

“Every time someone ties up, something else is closed.” – MA fisherman’s wife

“The handful of boats that are left, the fishermen that really work hard at it, will probably survive and do very well. But there’s no way that the industry..., it, the problem is when you’re cutting down on the number of boats you’re cutting down on the infrastructure.” - New Hampshire fisherman

Increased limitation of fisheries access has had continually-unfolding impacts on fishing communities over the past few decades. As the trend toward more conservative management has continued, the number of vessels has declined in many fisheries. With less product for the plants to process, less repair work for the boatyard to perform, and less ice and fuel and fewer groceries

purchased, a community built around commercial fishing very much feels the impact of decreased fishing activity. Not surprisingly, interviewees by-and-large began by mentioning the number of active vessels in their port when asked questions relating to the health of their community.

“Well...the reduction in fleet means less people employed, there is obviously less boats, less people there, you have less gear being bought out of gear stores, you have less winches being built, you have less hydraulics being work done, you have less... you can't really have less plant workers because they have to have a crew to cut fish but how many days a week are they going to be cutting fish? So now all the sudden you have plant workers that are used to working 5 days a week, maybe they are only going to be working three days a week. That's not enough time for them to make enough money to feed their families and it's a specialized industry, you don't just get, go down the street and find somebody who knows how to fillet fish and ... what happens when they decide well , 'I'm not going to fillet fish because I don't get enough hours.' All the sudden you get no filleters, what do you do? It's... I think it's a domino effect. I hope I'm wrong but my gut sees the whole industry tumbling.” – California industry participant

This direct line of impact, from the number of active vessels to the businesses that surround and support the fishing industry—and ultimately to the overall state of the fishing community—was traced by participants on both coasts. Some informants also reported that trawl vessels are particularly important for many ports, both for the fact that they provide a consistent supply of product to local processors, and because they require a greater amount of maintenance relative to vessels with other gear set-ups, keeping boat mechanics and gear suppliers busy.

Competing waterfront interests and the shrinking presence of fisheries

Many coastal communities that have traditionally been economically anchored by fishing are shifting their focus to attracting tourists and new kinds of residents, and this shift in focus often has direct impacts on shore-side infrastructure. Increased pressure from non-fishing interests for waterfront space was a theme on both coasts, though it was most ubiquitous in the Northeast. These interests included residential, recreational (fishing and otherwise), and hospitality businesses. Interviewees (again, primarily East Coast) also pointed to an influx of both tourists and new residents coming to town, bringing with them an influx of dollars and a different outlook on the harbor than a lifelong community residents attached to the commercial fishing industry might have. This growing segment of some communities was not always seen as well-versed or particularly interested in fisheries issues, which seemed to contribute to the largely shared sense that the “heyday” of fishing communities is in the past.

“As the commercial fishing declines you see a reduction in that, in that independent type attitude that type of attitude that settled the west. Entrepreneurial spirit and risk takers. It changes the demographics of

your community. I am not saying it is something you can sit and observe and notice because it is so gradual. It definitely does happen. As fewer young people go into the industry what happens is they probably tend to move away because those are a large portion of the jobs that are in the community so they go on and rather than go into the fishing industry they go on and get college degrees, and move to the city so you have, you start losing that generational aspect of your community that we have had for 100 years. Then that results in the people that you do have in your community not having as vested an interest in that community because it's not as generational. – Washington fisherman

In addition to those elements, industrial non-fishing interests—like wave energy and cable internet infrastructure—were also seen as outside sources of pressure towards consolidation. This particular aspect of consolidation was slightly more prominent in the East Coast sample, perhaps due to the larger number of wind energy projects already under discussion, planned, or in place. Participants on both coasts also identified spatially-based conservation measures as major impediments to business, and they were often implicated as a contributing factor in the diminished viability of small boats, given that restricted areas often house species smaller boats have historically targeted.

Exiting the Fishery and Adaptability

Cinner et al. (2009:128) note that “fishing is a choice, not purely a necessity, and must be viewed in this context when considering the person’s motivations and decisions to enter or exit.” There have been a number of attempts to estimate which factors will affect the choice of fishermen to exit a fishery, including a variety of socio-demographic factors. Muallil et al. (2011) found that heterogeneity in fishermen’s willingness to exit a fishery was linked to age as well as other social drivers such as education, dependency on the fishery for their livelihood, and their individual adaptive capacity. Satisfaction with the industry (re. job satisfaction, cultural identity/way of life) and barriers to exit are likely dominant factors affecting exiting behavior (Acheson et al. 1980; Gatewood and McCay 1990; Anderson 1980; McCay et al. 1993; Smith 1981; Smith and Clay 2010; Pascoe et al., 2015; Seara et al., 2016).

Henry and Johnson (2015) classify responses to threats and change as: *coping* or smaller, short-term reactions that can easily be reversed and modified as threats change versus *adaptations*, or longer-term adjustments that require more investment and organization and are more difficult to alter in the future. The study results below allow understanding of how members of the industry perceive their

ability to adapt (re. Seara et al. 2016) and allow a greater understanding of challenges that new entrants must adapt to in order to survive.

Leaving fishing

The most common responses related to leaving fishing (leaving fishing due to regulations, preparing for retirement, or had already left fishing) were almost exclusively people from the commercial groundfish fishery on the East Coast. However, the initial groundfish catch share allocation has had an impact on the commercial fishing industry workforce on both coasts. Interviews frequently mentioned that the initial low allocations were not enough to maintain a small independent business. Several interviewees said they had already left or will eventually end up leaving the industry, specifically citing low allocations. In fact, 70% of East Coast catch share interviews stated that regulations are causing fishermen to leave the industry, (see Table 6 below), as compared with only 20-30% of other East Coast categories. West Coast categories, in contrast, were fairly similar.

Table 6: Distribution of the code "Regulations-leaving fishing" for the East and West Coast separately and overall

Sub- group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
Catch share fishermen	23	16	70%	49
All other fishermen	44	12	27%	32
Other	39	8	20%	17
<i>EC overall</i>	<i>106</i>	<i>36</i>	<i>34%</i>	<i>98</i>
WEST COAST				
Catch share fishermen	49	27	55%	52
All other fishermen	11	6	55%	15
Other	37	13	35%	29
<i>WC overall</i>	<i>97</i>	<i>46</i>	<i>47%</i>	<i>96</i>
TOTAL OVERALL	203	82	40%	194

Adaptability

Prototype of a fisherman

For many fishermen, fishing is more than a livelihood; rather, it is viewed as a 'way of life' which binds them to the industry (Coulthard 2012; Gatewood and McCay 1990; Monnereau and Pollnac 2012; Pollnac et al. 2012). Seara et al. (2016) found that subjective, or perceived, adaptive capacity in New York and New Jersey commercial fishermen was tied to age and experience in the fishery and related to cultural identity and way of life. Interviewees within our sample often discussed commercial fishermen as being adaptive by nature. In order to be a successful fisherman, one must be resilient, adaptive, and flexible. For both the East and West coasts, fishermen discussed resiliency and innovation as being the most important factor in having a business that can survive through a constantly changing industry. This was seen through all fisheries, time periods, and age groups. As one fisherman in California states *"we are going to have to adapt, I mean that's just the way it is. Fishermen don't like change... but we are going to have to."*

Many people throughout our entire sample describe the type of fisherman who can adapt. The perception of fishermen and people involved in the industry is that you need to be hard working, smart, business savvy, and prepared to experience financial impacts to the business at any time:

"Your ability to learn and adapt lends itself to acceptance. And if you are a slow learner or if you are hard to educate, then you will not love this system." - Rhode Island fisherman

"...If you can't recognize change in anything that you are doing, you are not going to survive. You have to be able to recognize change and try to adapt to it and not a lot of people can do that." - California fisherman

Often times fishermen discussed differences in a good fisherman today as compared to generations before them. Fishermen today need to be business smart and prepared to understand regulations and new technologies. On the vessels *"you're surrounded by 7 flatscreens and computers and laptops and GPS and satellites,"* which can be difficult for some to understand enough to have a successful business:

"For them, for the old-timers, it really rides on them, you know? I mean, it's bad on us, even the younger guys. It's bad, but...for those guys its...it's completely debilitating. They can't figure it out. Most of them aren't very computer savvy, and now you have to be, you know?" - Rhode Island fisherman.

Fishermen today are also frequently being asked to adjust their business to new rules and regulations. As one Rhode Island fisherman stated, *"it's not the Wild West anymore either. It's not the '70s and '80s where it was...you know, guys were just running rampant, you know? It's a real business now."* In order to have a fishing business today, one needs to be *"an efficient and effective fisherman."*

With fishermen *"It's always good to better yourself... you got to change your strategy a little bit just to keep in the game."* Fishermen on both coasts expressed the need to *"fish smart"* because today you need to learn how to *"not catch fish."* Examples of *"fishing smart"* for the west coast, fishermen talk about burning more fuel to stay away from black cod and still catch the fish they need to. On the East Coast, it was said that fishermen need to fish careful by avoiding cod and flounders to continue to catch haddock, pollock, and redfish: *"Guys have to fish smarter now. They can't just drag. They've got to fish."* - Rhode Island fisherman

Portfolio fishing as an adaptive strategy

Findings of the importance of portfolio fishing (or fishing multiple species, either concurrently or successively throughout the year) were found in the literature both in and out of the U.S. Shaffril et al speculated that fishermen may be reluctant to learn alternative skills to fishing. In Norwegian fisheries described by Jentoft (1998), flexibility (i.e., fishing farther out at sea, on different stocks, or with different gear) and livelihood diversity were instrumental adaptation strategies. But West & Hovelsrud (2010) showed that fishermen perceived constraints to such flexibility -- which included fishing regulations, mechanisms within the global market, national tax systems, and insurance requirements for fishing boats. Similarly, McCay (1978) described how diversification in the Atlantic surfclam fishery was unlikely, due to its specialized gear, except by switching to ocean quahogs, a choice constrained by lower demand and the requirement to fish in deeper waters. A few vessels did switch, but they were more likely to simply supplement surfclams with ocean quahogs (McCay and Creed, 1990, McCay et al. 1989).

Having a diverse fishing business is perceived by most fishermen within our sample as being the most imperative factor in remaining resilient and adapt. Looking at Table 1 below, you see the distribution of fishermen that discuss the topic of portfolio fishing; whether they personally do, the industry as a whole participates in portfolio fishing, and its importance to the industry was coded here. Catch share fishermen had the highest percentage of mentions; coincidentally, the East and West Coasts had the same percentages, with 57% of the documents mentioning portfolio fishing at least once. It is still, however, seen as important by all other fishermen and industry support interviewees.

Table 7: Distribution of the code "Portfolio Fishing" for the East and West Coast separately and overall

Sub- group	# of interviews	# of interviews with mention	Mention rate	Code segments
EAST COAST				
Catch share fishermen	23	13	57%	38
All other fishermen	44	20	46%	47
Other	39	15	38%	25
<i>EC overall</i>	<i>106</i>	<i>48</i>	<i>45%</i>	<i>110</i>
WEST COAST				
Catch share fishermen	49	28	57%	82
All other fishermen	11	4	36%	15
Other	37	13	35%	28
<i>WC overall</i>	<i>97</i>	<i>45</i>	<i>46%</i>	<i>125</i>
TOTAL OVERALL	203	93	46%	235

Fishermen of different age groups discussed their perceptions of portfolio fishing in different ways. While the older generation (50 years old and above) talked mostly about the way in which they portfolio fished in the past, the younger generation discussed their ability to portfolio fish today. The older generation discussed the ability to switch around to different fisheries and “self-manage” the stocks before regulations were strict. They would move around to different species until it seemed there was too much pressure on one species and moved on to another. They believed it was both healthy for the stocks and small boat fishermen.

“It used to be, many years ago, the kind of classic west coast combination boat was crabs in the winter, salmon in the spring and summer, tuna in the fall and then back to crabs in the winter.” –California fisherman

“I never expected to get rich. But we always made a livin'. We were able to go from scallops to chasin' flounders or goin' for cod fish or maybe you'd go fluke fishin' and then there's squid. I mean there was always somethin' for the small boat to do. But as this time has gone on, all of those little niches have been taken away.”
-Massachusetts fisherman

“They’re groundfishermen, finfishermen of various sorts, but they have bought new boats. In some respects, when it comes to the other fisheries, there are the guys that are positioning themselves to survive when things shift.”- Rhode Island shore support, net builder

Both younger and older generations did agree that flexibility is not as attainable now as it was in earlier decades, due to regulations. Fishermen worry that management systems today, in particular catch shares, encourage pressure on too few species. For example, many fishermen on the East Coast

have supplemented their lack of allocated quota by fishing for species such as monkfish, squid, scallops, and state fisheries. Many fishermen in Southern New England named at least one of these species as being critical in order to have a viable fishing business:

“we got bumped out of the groundfishery by the catch shares. We didn't get enough allocation to make a decent trip to George's Bank. We, if we went to George's Bank for haddock, we would keep three crew on the deck plus the captain. Most of the fishing we do now is squid, fluke, monkfish” – Rhode Island fisherman

On the west coast Dungeness crab and shrimp were among the top species viewed as being important as supplemental income to their groundfish business.

“I mean, it's definitely going to impact crab, hugely, because it's the last frontier there is no trap limit, it's pretty much a free for all, and it's already saturated. I'm going to gear up and go for it myself, I mean I have to I'm forced into it. Bottom line fishermen are fishermen and they are going to fish. If I have to go tuna fishing with... probably are plenty of tuna boats, I'm just one more. What's another 100 traps, 100 traps times a hundred and all of a sudden you have 10 thousand more traps.” – California fisherman

“You know, as you got more and more economic pressure on one fishery, that effort spills over into another fishery, I mean the...the boat is the biggest capital cost, so people would say ‘well, I got to do something with this boat, I got to go fish for something,’ and so they would put a different kind of gear on and enter into a different fishery. – California fisherman”

The table below shows the distribution for the number of species each fisherman reported fishing for on the East and West coasts. You will see the majority of our sample, almost 70% of fishermen, fish at least two or more species.

Table 8: Number of species fished for East and West coast separately and combined

	East Coast		West Coast		Both Coasts	
	N	%	N	%	N	%
1	27	30.3	23	38.3	50	33.6
2	25	28.1	10	16.7	35	23.5
3	17	19.1	18	30.0	35	23.5
4	9	10.1	6	10.0	15	10.1
5	6	6.7	3	5.0	9	6.0
6	5	5.6	-	-	5	3.4
Total	89	100.0	60	100.0	149	100.0

There are some geographical differences on the East Coast in the diversity of species targeted. For example in Point Judith, Rhode Island, one net builder in the port describes “... *they fish across different fisheries... they hedge their bets differently, they're almost like stock brokers in that respect, you*

have a diversified portfolio. A diversified fishing, you know, pursuits that is unlike the other ports... it really makes Point Judith stand out in that way.” While there are fishermen in Point Judith that have experienced economic hardships due to management and regulations throughout the years, there was an overall more positive feeling of share management in the port; this was unlike other places such as Scituate or Plymouth, MA where the impact on the small vessel fleet was substantial. Many in these ports noted that the number of actively fishing small boats has decreased from a couple dozen to a handful.

Howard et al., 2013 discuss fishermen’s adaptability to climate change, and find that fishermen who have chosen to continue in the fishery have made adjustments by accepting less money as they supplement target species for anything they are able to catch. Overall, their options are to take longer trips, move their residence, or change species – which may require changing gear (Howard et al., 2013).

Gear as an adaptive strategy

In order to be adaptive, fishermen noted the importance of new technology and innovation. On both coasts, fishermen described gear changes that are crucial to their business such as excluder devices or in particular on the west coast, changing to a trap fishery for black cod. While for some fishermen it is more efficient to fish with fixed gear, many fishermen stated concern over spatial conflicts with fixed gear versus trawl gear on the West Coast. Some fishermen noted that without the “race to fish” they can to catch their quota on their own schedule and plan to spend extra time on gear research.

“I think they’ve had to adapt to both the changes in the stocks, with declines, and adapt to new types of fisheries and grab the new type of gear to catch – they develop their own types of scallop drags. I think they have been very resilient.”- Maine fisherman

“Already we’re experimenting with different types of excluders, and different grating spacing for the hard excluders. And like I said, we’re heavily invested, so it’s not going to be something we take lightly. And you know, I have a lot of confidence that we can make it work. It’s not going to be easy, by a longshot, but I think we can make it work.” – Oregon fisherman

Catch shares and adaptability

Leasing quota

There were mixed views on catch share programs on both coasts in terms of leasing and the flexibility it provides. Some believed it did not increase flexibility because it was too expensive to lease fish, especially for the small boat operations. Many view leasing as a gamble because of the high costs of fish and the possibility the fish won't be there and/or the market price would not cover the lease price and vessel trips costs. There was discussion of larger vessels being able to lease fish and have the financial flexibility to make leasing profitable. On the East Coast, permit banks were set up in communities to allow fishermen to assist in making leasing affordable for small boat operations in the community. An example is the Gloucester Permit Bank in Gloucester, MA. There were mixed views on these permit banks, as some people didn't think they helped fishermen, while others took advantage of the low lease prices these permit banks offer.

There were discussions in the industry on both coasts of many people leasing all or part of their groundfish quota and either tying their boat up or fishing for other species. For the older fishermen, some had retirement plans that aligned with the implementation of catch shares management and they were able to retire and lease out their quota as additional income. On the other hand, those that perceive their allocation wasn't enough groundfish to sustain a viable business had mentioned frustrations in catch shares ruining their retirement plans because there is no value left in their vessel, permit or allocation.

"a lot of people are like me been doing it a long time and were thinking about maybe retiring and then now it is kind of getting the rug pulled out from under us. So yeah, it is a lot of unknowns, that's the scary part, all of the unknowns" -California fisherman

Leasing an entire share makes adaptability difficult for crew and fishery related businesses within the community. When boats are not fishing, they are not hiring crew or getting supplies from local fishing businesses. Some fishermen stated the desire to maintain quota within their fishing communities by leasing to only those fishermen within the community first, before they offer to those from other communities. Guidelines under sector management also require that leased quota is offered to sector members first (sectors are not tied to specific fishing communities and can have members from multiple communities). Fishermen on both coasts mentioned the flexibility to make extra income from leasing groundfish and then updating or buying new gear for other fisheries they are involved in.

Networking

There were some participants that reported an increased level of communication among fishermen and other industry participants resulting from catch share management. While this was more prevalent in the West Coast sample than in the East Coast sample, it did receive mention on both coasts. In general, discussions of an increase in communication were more common among those who held an allocation rather than leased in their respective coast's groundfish fishery. The following quote exemplifies the theme of increased communication due to catch share management:

"And we do a lot of, you know, that's the one thing I've really noticed since its gone to IFQ, because there is no competition for the fish anymore...there's a lot more cooperation between the fishermen. You know, where the...guys I used to directly compete with, I'd never talk to...now we're telling each other where we last saw the main body of fish." – Washington Quota Share owner

Previous studies have shown that community plays an integral role in adapting to system changes related to common pool resource situations (e.g., Ostrom, 2015; Singleton & Taylor, 1992; McCay & Jentoft, 1998; McCay, 2002). On the other hand, fishermen in the Atlantic surfclam fishery belong to a network that is a community unto itself and not tied to any fishing community; it has considerable historical continuity, depth, and significance to those involved (McCay et al., 2011).

On the West Coast, many discussed the importance of working together with other fishermen within catch share management by forming cooperatives or associations.

"In large, fishermen were not a cohesive group prior to this management system, they were very, very independent. There was an exchange ideas and they all know each other and that kinda of thing, but they have been very independent. This new system is the impetus behind their wanting to get together because some of them are of the opinion that if they don't get together they may not be able to survive. So, that's what coming around now, is there just, now they are talking about forming, you know, cooperatives, or regional associations."- California fisherman

The East Coast groundfish catch share program requires fishermen to form groups, or "sectors," in order to be allocated their share of Total Allowable Catch (TAC). There were mixed views on whether the use of sectors increased or decreased networking or relationships. As one state manager on the East Coast states "*the competition between sectors for quota and then some of the sectors, the sector members are much better at working with one another than others so there's intra- and inter-competition within sectors.*" A former fisherman in Rhode Island who sold his boat after the implementation of sectors in the groundfish fishery states:

“I think what sectors have done is they have really hardened the lines between sector members, non sector members, guys with allot of allocation and guys with a little allocation. So its really as far as I can see its caused some rift in the industry which I think is totally detrimental to what we really need to do in order to survive.”
– Rhode Island fisherman

Although some saw negative impacts to relationships, other fishermen were happy with the sector they were involved in and originally formed them with other fishermen they knew well and trusted. Almost all sector members in our study sample, even those that were experiencing economic hardship from catch share management, were thankful for their sector managers and believed their role was important in the transition to this new management.

Discussion

The “graying of the fleet” is a widespread trend supported by demographic observations in the literature pertaining to a variety of fisheries issues. Existing data indicates that the fishing workforce is aging in US fisheries, as well as in far reaching fisheries like those in Norway, Japan, and Taiwan. Oral histories and semi-structured interviews included in our study found “graying of the fleet” on both the US East and West Coast and in both vessels and people. Graying is the result of a combination of factors influencing fishermen’s decisions to persist in, enter, or exit fisheries. For some seasoned fishermen, retirement may be postponed for financial reasons, while others choose to continue fishing because the way of life is part of their cultural and occupational identity.

At the same time, fewer young people are interested in entering the fishery, expressing pessimism towards fishing as a career option due to its hazardous nature or financial instability (because of environmental change or the regulatory environment); some interviewees even said that they were not encouraging their to enter the industry. Those that *are* interested face challenges such as high or even prohibitive entry costs. This latter issue was especially remarked on by those in catch share fisheries. Some see the only way for a young person to enter the industry as being born into a fishing family; yet, others noted the financial challenges of the current fisheries mean they simply were not able to pass the business down to the next generation.

Our study suggests that with the implementation of catch shares management comes the shift toward a more corporate business model; this makes it harder for a young person to begin their career as a deckhand and eventually work their way up to becoming a captain and/or owner of a fishing vessel.

Analyses of ITQ and other catch share programs provide insight into how these management approaches have contributed to aging trends as fleets are consolidated. The age distinctions between permit holders and crew members described in the literature are indicative of how costs associated with privatized fisheries may disproportionately impact young fishermen who are looking to accumulate capital for entry. Crew members may absorb the costs of permit leasing, and fleet consolidation leads to reduced crew sizes and job loss (Olson 2011). As Bennken et al. (2016) explain, “the average limited entry permit costs as much as an upscale home.” With financing costs in excess of \$500,000 for the purchase of a boat, gear, and permits (Volz, 2005) under some catch share fisheries and the increasingly common use of catch share regulations (Economics Program, n.d.), the next generation of fishermen will continue to face high financial barriers to entry into the industry. In addition, owners/captain cannot afford to keep crew on vessels, which minimizes or eliminates the opportunity for crew to develop the skills needed to be a successful fisherman. This pool of less well-trained crew often leads to high turnover rates; exacerbating the problem of lack of training. Financial barriers have also been shown to discourage exit from consolidated fleets when unemployment rates were high, entry into other fisheries was limited, and outside employment options were few (and perhaps undesired).

Aging and outmigration have heightened government and industry concerns related to lost social capacity and the future sustainability of fisheries. The impacts of catch shares management has resulted in the perception of diminished communities due to the closing of businesses, both on and off the water, and loss of opportunities for new people to enter the industry. Some fisheries offset the aging workforce by recruiting foreign trainees. This option has been met with resistance in fishing communities that value preserving fishing opportunities for local citizens. One strategy fishermen described using to maintain their fishing livelihoods, however, is that rather than simply going out to fish, they become strategic businessmen. They may diversify their fishing portfolio in order to supplement for lost fishing quota or supplement their income with other part time jobs or investments.

Conclusion

Graying of the US commercial fishing fleet can only be understood by looking at the context that surrounds it, as well as the perspectives of the people who operate within that context to make a living. Although graying of the fleet has been identified in some previous fisheries literature, and observed in

our study, there is still much to learn about the phenomenon. By employing qualitative methods like the ones utilized for this project (i.e., unstructured and semi-structured interviewing, detailed text analysis), researchers can further their understanding of social issues in the fisheries, such as graying of the fleet, by exploring both context and perspective. However, additional collection and analysis of qualitative data for the specific purpose of clarifying the graying of the fleet issue is necessary in order to arrive at more rigorous conclusions, and indeed there does seem to be a growing recognition that these kinds of studies are necessary.

It is further of note that so much information the topic of graying was found in the interviews compiled for this study, given that the majority were not collected for the specific purpose of understanding age dynamics in the fisheries, but rather were part of other projects with various aims and objectives. In fact, none of the East Coast interviews and only a portion of the West Coast interviews had graying as even a partial focus. The fact that such strong themes and trends were present—despite the fact that these interview formats allow participants to guide the discussion in accordance with what they themselves see as important—is quite striking. It suggests that existing oral history and other interview collections may be a useful source for mining data on a variety of issues unrelated to their original purpose. While this kind of post-hoc analysis does have its limitations, it effectively sheds light on the dynamics of a given issue—in this case, graying of the fleet—and can serve to inform subsequent studies.

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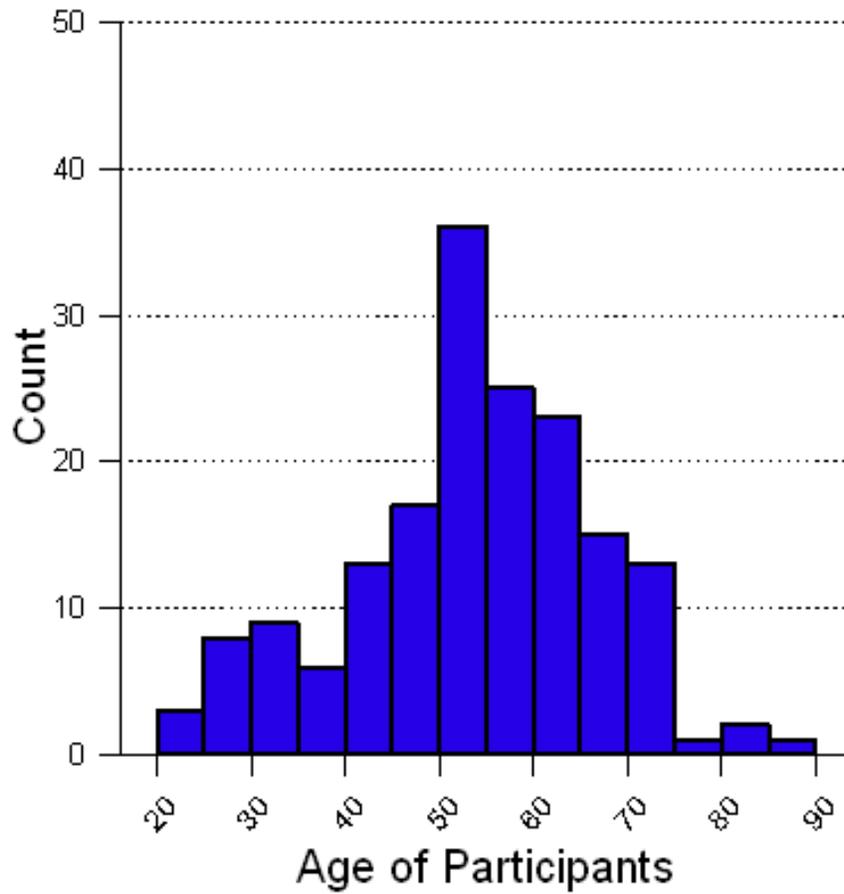
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Appendix I

Distribution of Participant Age



	Age
N	172
Minimum	22
Maximum	85
Arithmetic Mean	52.9
Standard Deviation	12.9

APPENDIX II

Completed Interviews by State

West Coast

States	Frequency	Percent %
AK	3	3.1%
CA	30	30.9%
ME	1	1.0%
OR	56	57.7%
WA	7	7.2%
Total	97	100.0%

East Coast

States	Frequency	Percent %
MA	53	48.6%
ME	16	14.7%
NH	1	0.9%
NJ	4	3.7%
NY	4	3.7%
RI	31	28.4%
Total	109	100.0%

APPENDIX III

Year interview completed:

West Coast

Year	Frequency	Percent %
2005	1	1.0%
2007	1	1.0%
2008	1	1.0%
2010	29	30.2%
2012	31	32.3%
2013	3	3.1%
2014	24	25.0%
2015	6	6.3%
Total	96	100.0%

East Coast

Year	Frequency	Percent %
2004	13	12.3
2005	2	1.9
2006	7	6.6
2007	6	5.7
2008	8	7.5
2009	8	7.5
2010	10	9.4
2011	14	13.2
2012	38	35.8
Total	106	100

APPENDIX IV

Role/Position of sample

West Coast

Role/Position	Frequency	Percentage
Owner	25	22.9%
Captain/Owner	19	17.4%
Fisherman's Wife	19	17.4%
Captain/Skipper	17	15.6%
Shore Support	17	15.6%
Other Relation*	12	11.0%
Total	109	100.0%

*Other relation includes managers, association members, observers etc.

East Coast

Role/Position	Frequency	Percentage
Captain/Skipper	46	39.3%
Crew	22	18.8%
Fisherman's Wife	22	18.8%
Shore Support	17	14.5%
Captain/Owner	6	5.1%
Owner	2	1.7%
Other Relation*	2	1.7%
Total	117	100.0%

* Other relation includes managers, association members, observers etc.

APPENDIX V

Fishery Involvement

West Coast

Fishery	Frequency	Percent %
Groundfish (trawl and fixed gear)	45	35.4%
Dungeness Crab	30	23.6%
Pacific Whiting	14	11.0%
Pink Shrimp	14	11.0%
Other	24	18.9%
Total	127*	100.0%

* All species mentioned were included in total

East Coast

Fishery	Frequency	Percent %
Groundfish	64	34.8%
Scallop	24	13.0%
Monkfish	12	6.5%
Squid	25	13.6%
Lobster	22	12.0%
Other	37	20.1%
Total	184*	100.0%

*All species mentioned were included in total

APPENDIX VI

Code System

Code	Sub-Code	Definition	# of Coded Segments
Regulations		Any mention of regulations that are impacting interviewee; specific issues that they are experiencing with certain types of regulation i.e. catch shares, allocation amounts, observer coverage, days at sea, etc. (separate from regulations captured under impacting next generation or ability to fish any longer/leaving fishing); if it seems useful capture it.	413
	Process	Discussion of the management process (i.e. level of input, things that influence the process, allocation, etc.)	465
	Observers	Any mention of the observer program	83
Consolidation		Diminishing of small boat fleet, single or corporate owner with multiple vessels	275
Well Being		Loss of heritage, Interviewee or fishermen as whole have had impacts to their personal well-being (depression/anxiety/health issues)	5
	Personal	Personal and family level well-being	174
	Community well-being	Reference to the state of the local port community	166
Adaptability		Specific operational details about how fishermen fish under changing management/regs. to maximize their business profits; how changing management/regs. have made doing business easier or harder. This also includes not being able to adapt	305
	Portfolio fishing	Switching or adding additional species, changing species; can be double-coded with less groundfish	135
	Prototype	Any description of what it takes (mindset, character traits, etc.) to be a successful fisherman	117
	Change in network	Increasing or decreasing communications, change in nature of communications with each other or within fisheries	120
	Regulations limit adaptability	Regulations are mentioned as limiting flexibility in the industry	162
	No groundfish	Exited fishery (different than left fishing-completely left industry)	68
	More groundfish access	Obtaining more access to groundfish than what they were allocated-- Leasing, buying more permits, more boats	115
	Less groundfish	Fish for groundfish less than they used to (make memo when they're exclusively leasing out their quotas - absentee ownership)	150
	Gear changes	Switching gear or altering gear, changing mesh sizes, rope sizes, etc.	86

Leaving Fishing	Any mention of leaving, getting pushed out of the industry in the past, present or future tense in reference to personal experience, any reference to retirement	93
Crew leaving fishing	Regulations have forced interviewee or the industry as a whole to leave fishing	88
Regulations-leaving fishing	Regulations have forced interviewee or the industry as a whole to leave fishing	195
Trying new industries/jobs	The mention of leaving the fishing industry to change career or attain new job; part-time or full-time; currently or in the future ***re-code as adaptability, will be sub-coded after this round	59
Uncertain of the industry	Any mention of uncertainty of the industry as a whole in the present or future; uncertainty of others remaining in industry; people leaving	297
Uncertain PERSONAL fishing business	Mention of unstable personal fishing business in the future; not sure if business will continue; leaving due to failed business	174
Retiring Out of Fishing	Any mention of plans to retire from the industry	73
Left Fishing	Interviewee has already left the industry	72
Next Generation	Whether children or grandchildren are going into fishing or not going into fishing. This also encompasses if a fisherman would encourage a youngster to go into fishing. Reference to the general workforce, new crew or boat owners.	268
No younger generation	Interviewee mentions not seeing any young people in the industry coming in; young people find the job unappealing and are not interested in joining the industry	232
Young people are involved in fishing	Respondent sees young people involved in the industry; have young people working for/with them; their kids are fishing	231
Regulations-entry difficult	Regulations are stated as affecting the next generation; the interviewee states regulations are having an impact on the next generation entering fishing; making it too expensive to enter, etc.	169
No opportunities for next generation	Startup costs are too expensive; lack of opportunities to enter; lack of jobs in fishing; lack of training for younger generation to learn the trade	271
Would not advise young to fish	Wouldn't recommend anyone to enter fishing; suggest go to college or find another career; suggest fishing as a backup or side job	133
Would advise young to fish	If respondent recommends young people should go into fishing; good career in fishing with opportunities	50
Aging	Any mention to the aging of the fishing workforce.	35
Aging people	Fishermen are aging; mention of average age of fishermen being high	144

Aging vessels	Mention of boats/vessels aging; personal vessels aging or fleet in general aging	37
Infrastructure	The future and present status of shore-side business, shore support, infrastructure and condition	58
Regulations Impacting Infrastructure	Regulations have had a direct impact on the status of infrastructure	98
Crumbling Infrastructure	Observation of the physical shore side infrastructure crumbling, in disrepair, or neglected	16
Closing Businesses	Observation of shore side support businesses closing down (gear shop, ice suppliers, processing plants, fuel, boat storage)	106

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Appendix VII

Questions that guided analysis

- 1) How are people adapting to changes? What factors are influencing their adaptive strategies or limiting their ability to adapt?
- 2) Do people perceive that consolidation is happening in the fishery? Max
 - a. How and why do they perceive its happening?
 - b. Are consolidation and graying linked, if so how?
- 3) What are the perceptions of the younger generation in the fishing industry?
 - a. What perception does the industry have of the ability to participate/ involvement of young people?
 - b. Are there opportunities for new entrants? Barriers?
- 4) What are uncertainties of fishing businesses (both personal and industry) perceived by fishermen? Aly
 - a. What are the reasons behind these uncertainties?
- 5) What are the perceptions of the health and future of fishing communities?
 - a. How do people perceive rationalization to be impacting their fishing communities?
 - b. What are the impacts at various levels (community and personal)?
 - c. Is graying of the fleet impacting fishing communities?