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The Perceived Ability to Cope and Adapt to Management Changes in Young and Old Fishers in Two New England Fishing Ports

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THE PERCEIVED ABILITY TO COPE AND ADAPT TO
MANAGEMENT CHANGES IN YOUNG AND OLD
FISHERS IN TWO NEW ENGLAND FISHING PORTS

BY

ANGELA ELENA SILVA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
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IN
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MASTER OF ARTS THESIS
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ABSTRACT

The present research aims at examining commercial fishermen's subjective resilience to management changes in two Southern New England fishing ports. This study also aims at analyzing the relationship between job satisfaction and level of occupational attachment with fishermen's perceived ability to adapt and cope to change. The two age groups examined were categorized into a younger and older generation by splitting the mean age value of 46.6 to ≤ 45 for the younger and >45 for the older generation. Three hypotheses were developed: 1) Management practices have negatively influenced older fishermen's perceptions on their ability to adapt to changes, where younger fishers perceive to be more resilient to management changes; 2) Level of resilience varies between fishing gear types. For example, those fishers participating in net fisheries perceive to be less resilient and able to adapt to changes than those fishing dredge gear; and 3) Between port differences may influence the relationships between variables in the first two hypotheses. In order to test these hypotheses, a total of 92 interviews were conducted with fishermen from the ports of Point Judith, Rhode Island and New Bedford, Massachusetts. Results of analyses show that there is no difference between age groups on fishermen's perceived level of resilience. However, results show a positive relationship between age and fishermen's Perceptions of Risk. Those involved in dredge gear fisheries (scallop, ocean clam/quahog) were shown to be more confident in their ability to adapt and cope to management changes. Results suggest that income and monetary gains play an important role in fishermen's perception of their ability to adapt and cope with changes. Correlations between levels of job satisfaction components suggest that a

decrease in satisfaction with income and financial needs could result in lower levels of perceived ability to adapt and cope with management changes. Results from this study have the potential to contribute to the expansion of knowledge and inspire future research about the adaptability of fishermen for future policy strategies.

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CHAPTER I

INTRODUCTION

Chapter I provides an introduction to the problem that will be investigated in the present study. The theoretical background that led to the development of the main research question and hypotheses, also discussed in this chapter, is presented here. This chapter also provides a description of the fishing ports studied.

1.1 Theoretical background and statement of the problem

The commercial fishing industry has lived through multiple periods of management change and in the past few decades has seen an increased emphasis on understanding the social impacts of proposed changes in management regulations in fishing communities. The 1976 passage of the Fishery Conservation and Management Act (Formerly FCMA, now known as the Magnuson-Stevens Fishery Conservation and Management Act after later reauthorization, or MSA) has been the largest change to affect U.S fisheries. It began a new era of expansion that was promoted by the U.S government (Young 1982). The intensification of foreign fishing off the coast of New England and the decline of important fish stocks, as well as the strengthening of a fisheries science in the sustainability of fishing resources set the stage for the 1976 FCMA (Gordon 1954). Many fisheries throughout the world today are recognized as being in crisis, with 31.4 percent of fish stocks estimated at being fished at biologically unsustainable levels in 2015 (FAO 2016).

1.1.1 Social Sciences in fisheries management

During the early years of the MSA, sociocultural data necessary for analyzing potential impacts of regulations was rarely available (Colburn et al. 2006). The MSA was amended extensively in 1996. The term “fishing communities” was recognized for the first time under National Standard 8 (NS8). NS8 or “the communities’ standard,” calls for the recognition of impacts that regulations have on fishing communities. Fishing communities are defined under NS8 as “a social or economic group whose members reside in a specific location and share a common dependency on commercial recreational, or subsistence fishing or on directly related fisheries-dependent services and industries (for example, boatyards, ice suppliers, tackle shops)” (Fed Reg. Vol. 63, No. 84, p.24235). NS8 states that “Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities” (16 U.S. Code § 1851(2)(8)).

1.1.2 The role of fisheries social science research

The U.S. National Marine Fisheries Service (now NOAA Fisheries), the governing body for fisheries, is responsible for the development of biological, economic, and social impact assessments (SIAs) of each proposed fishery regulation as required under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C§ 4321). According to Colburn et al. (2006) the passage of NS8 required NMFS to

“consider how fishing-dependent communities can adapt and sustain their engagement in marine resources harvesting and processing in the face of complex pressures” (2006: 234).

Colburn et al. (2006) reviewed research done by social scientists employed in fisheries on the federal, academia, and contractor levels and found common themes in their work including recognizing that some fishing communities are in crisis due to a combination of declining stocks, globalization effects, coastal development, climate change, and environmental degradation. A large part of the role of social science in fisheries management is to evaluate and predict how communities might respond to changes that are brought on by management efforts as a result of declining fish stocks and other external forces. Colburn et al. (2006) found that the role of social science raises a number of key questions related to the culture of fishing communities including: do participants quit fishing or adapt to new conditions?

1.1.3 Social Impacts of fisheries management

Management consequences for fishers and their families are multiple and interwoven. In a study by Pollnac et al. (2011), fishermen in the Southern New England region stated the regulations that were impacting the fishers the most consisted of gear restrictions, quota system, size/sex restrictions, days at sea, groundfish regulations, catch shares, and area closures. Nearly 45 percent of fishers' responses in Pollnac et al. (2011) identified changes in income as the most significant change due to regulations. Fishers also reported regulations have significantly impacted their fishing activity and families. Fishermen who participated in a study by Mederer (2000) in Point Judith, Rhode Island on impacts on commercial fishing

families from Amendment 5 and 7 of the Multispecies (groundfish) Fishery Management Plan, stated that the amendments caused stress that required much individual, family, and community adaptation. It was found that there was a unique blend of strategies to cope with the demands of fishing until Amendment 5 and 7. Regulations could be changed and imposed as data became available after Amendment 7 was enacted, so fishers in Point Judith stated that adjusting to one new reality was difficult because they were unable to control when, what, where, and how they could fish on a long term basis. The stress on families stemmed from the fishers inability to do this. There was little control and a lot of unpredictability, therefore impossible for families to plan for change (Mederer, 2000).

1.1.4 Studies of Resilience in fishing

Resilience is the ability of social and economic systems to cope with and adapt to change (Folke *et al*, 2002). The process of change, adaption, and resilience underlies all fisheries (Hanna, 2000). Adapting to changes involves making adjustments to changing circumstances in order to survive (Hanna, 2000). Fishers respond in different ways when a policy restricts use or access to the resource. Some may have the capability to incorporate the requirements of the policy change into their work and continue to function as a fisher. Therefore, they are recognized as resilient. Other fishers could decide that the conditions within the system have become socially or economically unsustainable and would rather leave the industry (Walker, 2004). Having the knowledge of a system's resilience enables managers to understand consequences of change events, including new policies. With this information managers should be able to choose policy options that balance social and economic

costs with sustainability goals of the resource. Such policy options should be those least likely to affect the system's ability to cope with change (Holling, 1996).

Marshall and Marshall (2007) built a conceptual model of social resilience for resource-dependent users. The response of fishers to anticipated change events was found to be determined by four characteristics; 1) perceptions of risk associated with change, 2) perception of the ability to plan, learn, and reorganize, 3) perception of the ability to cope, and 4) level of interest in learning to change. Those that were younger were more likely to take on the challenge of changes or set up a business outside the fishing industry. The idea of planning, learning, and reorganizing careers was unwelcomed by older fishers who couldn't see themselves doing anything else and were attached to the fishery, finding themselves too young to retire and too old to find work elsewhere. Those fishers that were in their early fifties were the most negative about their ability to cope. They believed they were too young to retire and unemployable in any other field (Marshall and Marshall, 2007).

Studies done in New England show an increase in average age over time in fisheries. Data was collected in 1977 (Acheson et al. 1980) and 2009/2010 (Pollnac et al. 2011) for job satisfaction studies. In 1977, the mean age was 33.9 years. In Pollnac et al. (2011), the overall mean age for fishers was 43.6 years. When asked the question 'would you advise a young person to enter fishing,' in 1977, 84 percent said yes while only 33 percent said yes in 2010 (Pollnac et al. 2011).

1.2 Objective of the study

Primarily, the present research aims at examining fishermen's perception of their level of resilience to management changes in Point Judith, Rhode Island and New

Bedford, Massachusetts, and examining the ability to cope and adapt to change within different age groups. The study also aims at analyzing the influence of job satisfaction and level of occupational attachment on their perception of their level of resilience.

1.2.1 Research question and hypotheses

Research question:

Have management practices affected the resilience of New England fishermen by limiting the perceived ability to adapt to changes in young and older fishers?

Hypothesis I:

Management practices have negatively influenced older fishermen's perceptions on their ability to adapt to changes, where younger fishers perceive to be more resilient to management changes.

Hypothesis II:

Level of resilience varies between fishing gear sectors. For example, those fishers participating in net gear fisheries are less resilient and able to adapt to changes than those in the dredge gear fisheries.

Hypothesis III:

Between port differences may influence the relationships between variables in the first two hypotheses.

1.3 Ports and Regions

1.3.1 Point Judith, Rhode Island

Point Judith is a village located in the town of Narragansett, Rhode Island on the western side of Narragansett Bay and opens out onto Rhode Island Sound. The Port of Galilee, located in Point Judith, has been Rhode Island's largest fishing port for many decades and ranks as one of the East Coast's most productive fishery landings sites (Pollnac et al. 2011).

The first commercial and subsistence fishermen of Rhode Island relied on simple techniques such as hook-and-line, floating fish traps, and beach seines. Seine fishermen often fished from the beach in Point Judith, with two men throwing a net from a row boat to surround the fish. Spot fishermen commonly rode on horseback and signaled the location of fish schools from ashore. With as many as sixteen men needed to haul in the net, neighbors would often help in exchange for a share of the fish (Acheson et al. 1980).

By 1885 Point Judith's fishing industry included a couple of sailboats and approximately 130 rowboats (Gersuny and Poggie 1973). Records dating from the 19th century show the introduction of new fishing techniques in Point Judith including trolling, lobster traps, and barrel traps. During the late 19th century, the first conflicts began regarding declining fish stocks and the use of these different fishing technologies in Rhode Island. Hook-and-line fishermen blamed the decline in a number of species in Narragansett Bay on the use of fish traps and seines. The Rhode Island General Assembly named a special committee to investigate the alleged disputes but it did not result in any specific measure to overcome the conflicts. The

situation illustrates the origins of the familiar debate in U.S fisheries history of the introduction of innovative fishing technology (Gersuny and Poggie 1973).

In October of 1947 the Point Judith Fishermen's Cooperative was established. The co-op was a means of looking out for the economic interests of the local fishermen. The co-op ensured higher fish prices and therefore higher incomes for the fishermen (Doeringer 1986).

Gross landings of many important species began to decline after 1960. In order to maintain a relatively stable amount and value of total landings, the Rhode Island fishing industry went through a phase of diversification. Offshore lobstering was introduced as a part of this diversification process. Wing trawls and pair trawls were also new methods introduced primarily for the capture of herring, another species that began to decline in the 1970s most likely as a result of the new technology (Doeringer 1986).

Traditionally, New England and Canadian fleets had the fishing grounds off the New England coast to themselves. In 1960, U.S fishermen were responsible for landing 90 percent of the resources harvested in Georges Bank grounds and the Canadian fishermen landed the remaining 10 percent. That same year, the first foreign "factory ships" arrived in New England waters and by 1972, American fishermen landed only a little over 10 percent of the harvest from Georges Bank grounds (Doeringer 1986).

The Point Judith Fishermen's Cooperative went out of business in 1994 as a result of declining stocks and overinvestment in infrastructure. It is now run as an independent fish marketing organization. The Commercial Fisheries Center of Rhode

Island was founded in 2004 and is home to nonprofit commercial fishing organizations. It serves “as a headquarters for bringing fishermen, scientists, managers, and elected officials together to discuss issues” (CFCRI nd).

The state’s fisheries are divided into three major sectors: shellfish, lobster, and finfish. The shellfish sector includes oysters, soft shell clams, and quahogs. The lobster sector primarily consists of the American lobster. The finfish sector targets a variety of species including groundfish, tautog, striped bass, black sea bass, scup, bluefish, butterfish, squid, whiting, skate, and dogfish.

From 1997- 2006, the value of landings in Point Judith varied but seemed to show a declining trend. There was a high of \$51 million to a low of \$31 million in 2002-2003. The landings value for squid, mackerel, and butterfish species grouping was higher in 2006 than the average value for the 1997-2006 time period. The lobster value for 2006, second most valuable in terms of landings, was lower in 2006 than the average of the same time period (1997-2006). In 2014, Point Judith ranked 25th in value in U.S. ports with \$50.4 million and 57.3 pounds landed (NMFS 2014). The top eight species in terms of value (\$) in Point Judith are shown in Table 1 below. Other species landed in Point Judith include small mesh groundfish, dogfish, bluefish, tilefish, and surf clam/ocean quahogs.

Table 1. Volume (lb) and value (\$) for significant species and species management complexes landed in port of Point Judith in 2014 (Data from NEFSC)

Species/ species complex landed	Value (\$)	Volume (lb)
Butterfish/mackerel/squid	12,978,653	13,730,684
Summer flounder/scup/black sea bass	10,597,803	7,951,230
Lobster	6,885,294	1,461,182
Scallops	6,611,242	530,883
Other*	3,374,974	2,943,592
Large mesh groundfish**	2,540,321	1,403,066
Monkfish	2,219,301	1,174,714
Skates	1,858,946	8,698,969

* Species not federally managed

** Atlantic cod, haddock, pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice, Atlantic halibut, Atlantic wolfish, redfish, ocean pout, and white hake

1.3.2 New Bedford, Massachusetts

The Port of New Bedford is located on the northwestern side of Buzzard's Bay, about nine miles from the Cape Cod Canal, 83 miles south of Boston and 166 miles north of New York. It has been the number one most profitable port in the United States since 2000, with landings over 140 million pounds and \$328.8 million in direct sales in 2014 (NMFS 2014).

The economy of New Bedford from the beginning was based on small farming and fishing villages. New Bedford became a major whaling port and by the time the city was incorporated in 1847, its ships were making voyages of two, three, and four years in pursuit of sperm, right, bowhead, humpback, and gray whales all over the world. By this time, New Bedford had surpassed Nantucket, London, and all other whaling ports both in size and tonnage of its fleet and value of its catch (New Bedford Whaling Museum 2013). In 1857, the port of New Bedford had 429 registered whaling vessels with an aggregate of 130,625 tons, amounting to 64% of the total American whaling tonnage and 59% of the value of the American catch. There were only 271 vessels registered elsewhere in the U.S., and New Bedford consisted of

nearly half of the world's whaling workforce with over 9,700 seamen employed (New Bedford Whaling Museum 2013).

The American whaling industry began to decline in the 1860s as the value of whale oil decreased with the discovery of petroleum. The last whale ship to leave the port of New Bedford sailed in 1925 (New Bedford Whaling Museum 2013). The city of New Bedford turned to textiles when the whaling industry declined (New Bedford Whaling Museum 2013).

Several changes in the mid 1900s allowed fishing to prosper in New Bedford, including trucking and refrigeration around 1940 which allowed the development of the fish auction in 1941. The opening of the fish auction in New Bedford allowed a centralized process of selling catch with set rules and time limits. The auction ended with a strike between fishermen and boat owners until in 1994 the Whaling City Seafood Display Auction was established allowing vessels to offload the catch into coolers and allowing buyers to see the catch (Orleans et al. 2010).

The primary target species in New Bedford are groundfish and scallops. Groundfish represented the most important fishery in the port for many years until fish stocks off the coast of New England showed signs of decline in the 1930s. As a result, scallops increased in focus in New Bedford. By the 1950s the port accounted for 70 percent of all the scallop landings in the U.S. (Hall-Arber et al. 2001).

Scallops were worth significantly more in 2006 than the 1997-2006 average values, the total value landed increased over the same time period. The landed value of groundfish in 2006 however, was considerably less than the ten-year average value. The number of vessels increased between 1997 and 2006, while the value of fish

landings more than doubled from \$80 million to \$184 million over the 1997-2006 time period. In 2015, New Bedford ranked the number one port in value with \$328.8 million in landings of 140 million pounds (NMFS 2015). Table 2 displays the top eight species and species management complexes with the greatest value (\$) with corresponding volume (lb) landed in New Bedford in 2014. Other species landed in New Bedford are skates, butterfish/mackerel/squid, summer flounder/scup/black sea bass, dogfish, bluefish, and tilefish.

Table 2. Volume (lb) and value (\$) for significant species and species management complexes landed in port of New Bedford in 2014 (Data from NEFSC).

Species/ species complex landed	Value (\$)	Volume (lb)
Scallops	251,379,861	19,838,634
Large mesh groundfish*	21,148,976	15,494,123
Surf clam/ocean quahog	20,392,065	26,392,650
Lobster	6,685,329	1,374,670
Other**	5,792,068	5,861,838
Small mesh groundfish***	4,845,629	7,017,258
Monkfish	4,599,767	1,918,965
Herring	4,466,542	40,701,336

* Atlantic cod, haddock, pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice, Atlantic halibut, Atlantic wolfish, redfish, ocean pout, and white hake

** Species not federally managed

*** Silver hake (whiting), red hake, and offshore hake

1.4 Thesis Organization

The present study is organized into five chapters. Chapter II provides a review of the literature important to the primary focus of this study. Chapter III reviews the research methods used, including a more detailed discussion of the resilience and job satisfaction variables used. Chapter IV presents the analyses and results and Chapter V presents the discussion and conclusions.

CHAPTER II

REVIEW OF LITERATURE

Chapter II provides a review of the literature on the main elements related to the present study. The first sections of this chapter present an overview of resilience theory, more specifically on resilience in different age groups as well as resilience studies of fishing and fishing communities. Concluding this chapter is a historical overview of the fisheries management strategies implemented on Northeast Multispecies (groundfish), a fishery that has gone through multiple management changes and is of interest in the ports studied in this research.

2.1 Resilience theory

Through studies of interacting populations like predators and prey and their functional responses in relation to ecological stability theory, the resilience perspective emerged in the 1960s and early 1970s (Holling 1961, Lewontin, 1969, Rosenzweig 1971, May 1972). Ecologist Holling (1961) introduced resilience as the capacity to persist within a domain in natural systems in the face of change. He proposed that “resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb changes of state variables, driving variables and parameters, and still persist” (Holling 1973, 17). A number of studies of resilience have focused on the capacity to absorb shocks and still maintain function.

One aspect of resilience concerns the capacity for renewal, re-organization and development (Gunderson and Holling, 2002; Berkes et al. 2003). The importance of clear and measurable definitions of resilience has become vital. Gunderson and Holling (2002) define resilience as the capacity of a system to undergo disturbance and maintain its functions and controls. Resilience is measured by the magnitude of disturbance the system can tolerate and still persist. This definition is contrasted with Pimm (1984) who states the appropriate measure of resilience is the ability of the system to resist disturbance and the rate at which it returns to equilibrium following disturbance (Pimm 1984, Tilman and Downing 1994). These two definitions and the contrast between the two has been useful in encouraging managers to think about the persistence of systems and allowed them to break away from traditional management techniques which focus on the unachievable goal of stability.

Resilience as applied to ecosystems or integrated systems of people and the natural environment, has three characteristics: (a) the amount of change the system can undergo and still retain the same controls on structure and function, therefore remaining within the same domain of attraction; (b) the degree to which the system is capable of self-organization, rather than lack of organization or organization forced by external factors; (c) the degree to which the system can build the capability to learn and adapt (Carpenter et al. 2001, Resilience Alliance 2012). An important attribute of this definition is that it is a system-wide definition where it focuses on the behavior of the entire system whether it is a coastal community or a large marine ecosystem. This is in contrast to some resource management strategies such as single-species fishery or species complexes (i.e. Northeast Groundfish fishery) management which attempts to

manage single species, or these species complexes in the context of a greater ecosystem. The transition to a more system-wide resilience framework can become problematic as major stakeholders in the ‘system’ can become marginalized.

The ecosystem resilience theory focuses on the ability to handle stress in an adaptive manner, which contrasts the idea of “engineering resilience.” Engineering resilience starts from the concept of equilibrium and focuses on how far a system can be displaced from a fixed point of equilibrium and still return to that equilibrium once the disturbance has passed (Holling 1996). Engineering resilience is more familiar and easier to model, but ecosystem resilience as a point of departure makes more sense for studies of institutional dynamics as well as socio-ecological systems (Holling and Gunderson 2002).

Resilience has more recently been applied to the concept of social-ecological systems, or SES (Carpenter et al. 2005). SESs are complex, integrated systems in which humans are part of nature (Berkes and Folke 1998). Social and ecological systems are linked as Norgaard (1994) and others have related interdependent and co-evolutionary relationships. The resilience of social-ecological systems depends on slowly changing variables such as climate, land use, nutrient stocks, human values and policies (Resilience Alliance 2012).

The dynamics of SESs can be described and analyzed in terms of a cycle, or the adaptive cycle (Gunderson et al. 1995, Gunderson and Holling 2002). The theory of the adaptive cycle argues that dynamical systems such as ecosystems, societies, corporations, economies, nations, and SESs do not lean toward some stable or equilibrium condition. Instead they pass through four characteristic phases; rapid

growth and expansion (r), conservation (K), collapse or release (Ω), and renewal or reorganization (α). The r phase merging into the (K) phase comprises a slow, cumulative forward loop of the cycle. At this point dynamics of the system are reasonably predictable. As the (K) phase continues, resources become locked up and the system becomes less flexible and receptive to external shocks. A chaotic collapse is inevitable and the (Ω) phase rapidly gives way to (α). The reorganization phase can be rapid or slow, during which innovation and new opportunities are possible. An unpredictable backloop can occur with the combination of (Ω) and (α) phase. The (α) phase leads into a successive (r) phase, and can resemble the previous (r) phase or be significantly different. Systems can move back from (K) toward (r), or from (r) directly into (Ω), or back from (α) to (Ω). The cycles occur at a number of scales and SESs exist as panarchies, or adaptive cycles interacting across multiple scales (Walker et al. 2004). The two systems are linked by the elements *revolt* and *remember*. The element *revolt* characterizes disturbance (Ω) of a small and fast cycle on large and slow events, usually breaking a state of conservation (K). The element *remember* is related to the learning processes that will help a system in the phase of conservation (K) to cope with the renewal phase (α) in a smaller and faster cycle.

Figure 1. Panarchy model proposed by Gunderson and Holling (2002) (adapted from resalliance.org)

Walker et al. (2004) note there are four crucial aspects of resilience: latitude, resistance, precariousness, and panarchy. Latitude is defined as the maximum amount a system can be changed before losing its ability to recover (Walker et al. 2004). Resistance is often seen as a complementary attribute of resilience in order to assess long-term persistence (Carpenter et al. 2001). Resistance is defined as the ease or difficulty of changing the system; how “resistant” it is to being changed. Precariousness is how close the current state of the system is to a limit or “threshold.” Panarchy is the idea that because of cross-scale interactions, the resilience of a system at a focal scale will depend on the influences from states and dynamics at scales above and below (Walker et al. 2004). Some examples Walker et al. (2004) give are external oppressive politics, invasions, market shifts or global climate change which can trigger local surprises and regime shifts.

Walker et al. (2004) use stability landscapes as a metaphor for their measures of resilience- latitude, resistance, and precariousness. A “basin of attraction” is a region in state space in which the system tends to remain. For those systems that move toward an equilibrium, the state is defined as an “attractor.” The basin of attraction represents all conditions that will lean toward the equilibrium state and there can be more than one such basin for any given system. All SESs however are buffeted by disturbances, stochasticity, and decisions of actors on a continuous basis. The basins that a system may occupy, and the boundaries that separate them, are the “stability landscapes” (Beisner et al. 2003).

Both exogenous drivers and endogenous processes can lead to changes in stability landscape. These include changes in the number of basins of attraction,

changes in the positions of the basins within the state space, changes in the positions of the thresholds (edges) between basins, or changes in the “depths” of basins, or the measure of how difficult it is to move the system around within the basin. The steep sides imply greater perturbations or management efforts are needed to change the state of the system (resistance). Moving the system around changes its position within a basin relative to the edge or moves it to a new basin (precariousness). Some basins are more desirable to the people in this system more than others and the objective might be to prevent the system from moving into an alternate, undesirable basin from which recovery may be difficult or impossible (Walker and Meyers 2004).

Resilience is often used in conjunction with “adaptive capacity,” a term with multiple meanings (Carpenter et al. 2001). Adaptive capacity is the capacity of the human actors in the system to manage resilience. It is also defined as the capacity of any human system from the individual to human kind to increase (or at least maintain) the quality of life of its individual members in a given environment or range of environments. Adaptive capacity reflects learning, gives flexibility to experiment and adopt novel solutions, and includes the development of generalized responses to broad classes of challenges (Walker et al. 2002). In the context of stability landscapes, adaptability can include: making desirable basins of attraction wider and/ or deeper, shrinking undesirable basins, creating new desirable basins, or eliminating undesirable ones, and changing the current state of the system to move deeper into a desirable basin or closer to an undesirable one (Walker and Meyers 2004). From a natural systems perspective it is becoming apparent that a more appropriate definition may allow for a coastal social-ecological system to ‘adapt’ itself in response to external

disturbances. In this case, large-scale structural changes can occur as long as the system remains capable of delivering the core services (Gibbs 2009).

There are a number of different conceptual definitions for resilience in the literature (see Walker et al. 2004, Carpenter et al. 2001, Folke 2006, Pollnac et al. 2008, Gibbs 2009). The objective of the present study is to apply the concept of resilience in a rational perspective in the context of U.S. fishing communities. The definition adopted in the present study is the ability of a system to cope with change during a specific disturbance. A resilient SES undergoing pressure may not necessarily go back to the previous state of equilibrium, but may change to a different desirable state.

2.2 Age and adaptability

Many studies in general psychology and vocational behavior have looked at the relationship of age with one's ability to cope and be resilient to change. The results of such studies are mixed in whether age plays a definitive role in one's ability to adapt to changes in one's life or work environment. Hamarat et al. (2002), note that research on age differences in coping has yielded inconsistent results, in part because of differing approaches used in measuring and qualifying coping and because of the selection of coping resources measured.

Individuals cope by either actively amending their environment to fit the circumstances or adjusting their personal preferences and goals to fit environmental demands (Brandtstädter and Rothermund 2002). Research suggests that the strength of the relationship between coping flexibility and psychological adjustment varies by

age. The accommodation process is essential for successful aging (Brandtstädter 2009).

As people get older they adopt more accommodative strategies to deal with limitations imposed. Many older adults report that they are happier, experience fewer stressful events, and have fewer negative emotions than do their younger counterparts (Auerbach & Gramling 1998). Older age is reported by many as a time of elevated satisfaction, marked by the pursuit of new endeavors and an increase in meaningful relationships (Bengston 1996).

A common stereotype about aging individuals is they lack the ability to adapt to stressful situations. Older individuals are portrayed as being unyielding in their responses or as using regressive defense mechanisms that distort reality instead of dealing effectively with it (McCrae 1982). Two studies found the influence of age on coping mechanisms to be unsupportive of this perception (McCrae 1982). At the time of McCrae's (1982) research, the author notes there was only a small amount of literature on age differences in coping, but two radically different hypotheses can be derived from them. Pfeiffer (1978) portrays older individuals as being rigid and unable to adapt, or prone to the use of passive and ineffective mechanisms. Vaillant (1977) proposes a similar developmental sequence but believes the defenses used by older people become increasingly more effective as mature mechanisms (altruism, humor, suppression, anticipation, and sublimation) increase with age. The findings of the McCrae (1982) study were comparable to other investigators using objective measures of coping (Billings & Moos 1981, Folkman & Lazarus 1980, Ilfeld 1980).

In a study by Zacher (2014), age positively predicted changes in overall career adaptability, control, and confidence over time. The author believed these findings could be explained by life span developmental research. The motivational theory of life span development suggests that individuals' ability to align the environment with oneself decreases with age. Aging individuals compensate for this decline by enhancing their desire to align themselves with the environment. This results in self-esteem gradually increasing throughout adulthood and allowing older individuals to experience greater increases in control and confidence over time than younger individuals (Zacher 2014).

Cheng et al. (2014) provide a meta-analytic review of all available studies conducted between 1978 and 2013 that tested the role of coping flexibility and psychological adjustment. Age was used as a moderator in the measurement of coping flexibility. The authors predicted that age may explain the variability in the strength of the link between coping flexibility and psychological adjustment because older individuals experience greater limitations and perceive more aging related uncontrollability (authors cite examples for their theory: Mullen et al. 2012, Murabito et al. 2008). In contrast, the young experience far fewer aging limitations and are more capable of taking direct measures to handle stressful events. As a result, the authors hypothesized the link between coping flexibility and psychological adjustment may not be as strong for younger individuals (vs. older). Cheng et al. (2014) found their hypothesis to be acceptable, age explained 13% of the variance in the positive relationship between the two and the link was significantly stronger within higher age groups.

Another interesting perspective, on the generational differences between people, O'Connell et al. (2008) argue that those born in the Gen X generation, between 1965 and 1981, differ from those born in the Silent Generation between 1925 and 1942, and the Baby Boomers between 1943 and 1964. Gen X'ers tend to distrust hierarchy, like more informal arrangements, and prefer to make judgments based on value rather than on status. Gen X'ers entered the work force at a time when career planning and development were largely individual responsibilities and the average worker expected to make several considerable changes in their employment or career direction. Therefore, it seems likely that the Gen X generation is more adaptable than those in some other age categories. The authors examined how individual adaptability is associated with personal characteristics; age being one characteristic, as well as other factors such as the organization of the work environment and accumulation of human capital. The authors cite Ayres and Potter (1989), who believe motivation to change decreases with age and propose that middle-age individuals should be more adaptable than elderly ones. Reise and Gold (1993) however, state that both middle-age and older adults may have negative attitudes toward developmental experiences that are required to become adaptable because it is unexpected at that point in their lives. As a result, the authors hypothesized and found there was no such correlation between age and adaptability.

Johnson's (1998) best-selling book offers a metaphor for individual differences in reactions to stressful life changes. Some people are sensitive to and ready for such changes and are vigorously trying various coping strategies to deal with the changing environment, while others feel surprised and uncomfortable when changes occur and

resist formulating new strategies to cope with the altered environment. Those individuals that are characterized as having a flexible coping style will readily vary their strategies and those that are inflexible adhere to the same old strategies regardless of situational changes.

2.3 Theory of Innovation

Rogers (2003:12) discusses innovations as being an “idea, practice, or object that is perceived as new by an individual or other unit of adoption...the perceived newness of the idea for the individual determines his or her reaction to it. If the idea seems new to the individual, it is an innovation.” This can be applied to the social and economic changes associated with fisheries management. The rate of adoption is the “relative speed with which an innovation is adopted by members of a social system” (Rogers, 2003, 23). When a number of individuals in a social system adopt a new idea only a few individuals adopt the innovations at first and then the number begins to climb as more individuals adopt the idea. The rate of adoption begins to level off, as fewer and fewer individuals remain who have not yet adopted the idea (Rogers, 2003).

Rogers (2003) makes generalizations based on the literature concerning the importance of socioeconomic status, personality variables, and communication behavior in adopting an innovation. An example of a generalization with regard to socioeconomic status is that earlier adopters are not different from later adopters in age. About half of the 228 studies analyzed show no relationship, 19 percent show that earlier adopters are younger and 33 percent indicate they are older. Another socio-economic generalization is that early adopters have more years of education than

later adopters. Additionally, early adopters are less fatalistic than later adopters where fatalism is the degree to which an individual perceives a lack of ability to control his or her future. If an individual believes that they are in control of their future, they are more likely to adopt an innovation. Lastly, an example of a communication behavior is that earlier adopters have greater exposure to communication channels and have greater knowledge of the innovations than later adopters (Rogers, 2003). The adoption of new management and the ability of fishers to cope with these changes can be examined in terms of Rogers' findings.

2.4 Resilience and coping in fishing

The overexploitation of fisheries is a global concern (Jackson et al. 2001, Worm et al. 2009) and policies that regulate natural resources are increasing in number and inflexibility (Holling and Meffe 1996, Caddy 1999, Ostrom et al. 1999). The concept of resilience is now used in a great variety of interdisciplinary work concerned with the interactions between people and nature (see Gunderson et al. 1995, Hanna et al. 1996, Ludwig et al. 1997, Berkes and Folk 1998, Redman 1999, Kinzig et al. 2000, Gunderson 2000, Gunderson and Holling 2002). Managing for resilience allows resource managers to design resource-protection strategies that minimize socioeconomic impacts without minimizing the system's ability to cope with future disruptions, whether they be natural or man-made (Lane and Stephenson 1997, Levin et al. 1998, Carpenter et al. 2001, Scheffer et al. 2001). The impacts on resource users can have significant social and economic implications on fishers and where they live and work (Smith and Jepson 1993, Smith et al. 2003, Clay and Olson 2008, Tuler et

al. 2008); therefore, resource policies that are implemented without considering the social consequences can often cause long term impacts and conflicts.

In the face of changing environments, declining fish stocks, and increasing regulations, there has been growing concern for the adaptation and resilience of fishing communities (Robards and Greenberg 2007, Marshall and Marshall 2007, Allison et al. 2007, Healey 2009). National Standard 8 recognizes that management efforts affect not only the fishermen or harvester but also the community, including a variety of fishing related shore-side businesses such as processing plants, boatyards, suppliers, and tackle shops (Fed. Reg. Vol. 63, No.84, p.24235). A social impact assessment (SIA) of proposed changes to fisheries regulations that could adversely impact fishing-dependent communities is required under NEPA (NEPA; 42 U.S.C § 4321). Increased efforts have been made to measure impacts on fishing communities with Jacob et al.'s (2013) development of indices of resilience and vulnerability for fishing communities in the Gulf of Mexico as well as ongoing efforts by the National Oceanic and Atmospheric Administration (NOAA Fisheries) to expand the use of these indicators into other regions of the U.S (Jepson and Colburn 2013). The use of the indicators of vulnerability and resilience in evaluating the response of fishing communities to change is grounded in a broader social scientific effort to gauge the ability of social groups to adapt to change (Jepson and Colburn 2013).

While measuring influences at a community level is vital, measuring resilience and vulnerability at the individual fisher level is also essential in understanding potential impacts on management changes. The ability of resource users to cope with and adapt to changes in management of resources will determine the social and

economic impacts of their response (Marshall and Marshall 2007). Marshall and Marshall (2007) developed a conceptual model for resource managers to practically incorporate resilience knowledge into policy development and implementation. The authors use the commercial fishing industry in North Queensland, Australia as a case study, using survey questions to measure resilience by asking participants to assess their expected level of well-being in terms of acceptability, flexibility, other opportunities, and willingness to be creative in their approach to adapting to policy change. The authors (Marshall and Marshall 2007) found that resilience in commercial fishers confronted with policy change can be described by four characteristics: (1) the perception of risk associated with change; (2) the ability to plan, learn and reorganize; (3) the perception of the ability to cope; and (4) the level of interest in change. The measures of subjective resilience developed in this study are used in this study and are examined in Chapter III.

Coulthard (2012) offers an illustrative example of three possible ways that fishermen could cope and reorganize through a review of literature: exit strategy, livelihood diversification, and remain fishing. The first suggests seeking alternative options outside of fishing which can have negative influences to subjective well-being, particularly aspects of job satisfaction and self-actualization (Pollnac and Poggie 2008). Livelihood diversification allows fishermen to cope during difficult periods by continuing to fish but diversifying enough to get by. The author notes multiple studies that have shown fishermen doing so to cope during lean periods (McCay 2002, Béné et al. 2003, Pomeroy et al. 2006). Fishermen diversify their livelihoods for the high risk of the occupation, seasonal fluctuations in the resource, and to reduce the risk of

livelihood failure by spreading it across more than one income source (Allison and Ellis 2001). Many fishers who do diversify their livelihoods still remain fishing at least part time (Smith and Clay, 2010).

For people presenting strong occupational attachment, the idea of losing their jobs may represent not only the loss of income, but part of their self-identity (Marshall et al. 2007). Often times, resilience and well-being can be considered as partially overlapping concepts. The use of indicators to monitor sustainability and other measures of well-being for all components of marine fisheries has been promoted within international fisheries (FAO 2008). Indicators of well-being have been developed by anthropologists since the 1970s in many research fields and specifically fishing (Smith and Clay, 2010). In an effort to create a conceptual model for predicting the social impacts of fishery management action alternatives, Pollnac et al. (2006, 2015) show the relationship between multiple attributes that directly or indirectly influence well-being at individual and community levels (Figure 1).

Figure 2. The Social Impact Analysis (NESIA) model developed by Pollnac et al. (2006)

Job satisfaction is an important component of well-being. Management can drive changes to fishing communities that directly and indirectly affect aspects of job satisfaction and well-being (see Pollnac et al. 2006, 2015). Pollnac and Poggie (1988) first developed measures of job satisfaction in fisheries. Regulation-related changes in work conditions (e.g. ability to choose timing of fishing, income changes, time spent at sea) can decrease job satisfaction and have negative effects of mental health, physical health, and impaired personal relationships (Pollnac et al. 2006, 2008; Smith

et al. 2003). It has been well established that the structure of job satisfaction among fishermen has components not usually seen in other occupations (Acheson et al. 1980, Bunce et al. 2000, Pollnac and Poggie, 2008, Pollnac et al. 2011). Fishermen frequently describe fishing as more than just an occupation. Research by Pollnac and Poggie (2008) has suggested that satisfaction with the adventure-loving and risk-taking personality type is not influenced by changes in the basic needs (income, predictability in income, safety) component and fishermen manifesting this personality type are less willing to leave the occupation for alternative work. Numerous studies show that fishermen would resist leaving the occupation of fishing even when income is low (Crawford 2002, Binkley 1995, Pollnac et al. 2001). Considering the attachment that fishermen have towards their occupation, measures to maintain resilience within fishing must take into account the issues of job satisfaction and well-being to preserve community resilience.

Job satisfaction variables can provide results that are comparable over time and between different communities or regions, making them extremely valuable. Seara et al. (2016) provides a unique, through time comparison on job satisfaction among fishermen collected in three time periods: 1977, 2009/2010, and 2013/2014, using the 9-item scale (Pollnac et al. 2015) in two major fishing ports: New Bedford, MA and Point Judith, RI. Analyzing and understanding these changes through time increases our understanding of the important transformations and impacts that New England ports have experienced in the past few decades (Seara et al. 2016). The 9-item scale (Pollnac et al. 2015) was used to measure job satisfaction in the present research and is discussed in more detail in Chapter III.

2.5 Northeast Multispecies (groundfish): *An example of management change*

The Northeast Multispecies Fishery Management Plan (FMP) implemented by the Northeast Fishery Management Council (NEFMC) was developed in 1986 (previously the Groundfish Plan in 1977) and has since had 20 FMP amendments. The FMP covers 13 groundfish species: Atlantic cod, haddock, pollock, yellowtail flounder, witch flounder, winter flounder, windowpane flounder, American plaice, Atlantic halibut, redfish, Atlantic wolfish, ocean pout, and white hake (NEFMC 2016). The original Groundfish plan relied on hard quotas and then switched to minimum fish sizes and codend mesh regulations for the Gulf of Maine and Georges Bank to control fishing mortality (NEFMC 1994). In 1994, Amendment 5 of the FMP made significant changes seeking to eliminate overfishing of groundfish within 5 years (NEFMC, 1994). There were two major actions for this amendment. A moratorium on new vessel permits and days-at-sea (DAS) was implemented to reduce fishing effort. Permits were issued to entitle fishermen to a certain number of days in the season. Fishing effort was to be cut by 10 percent a year and restrictions were placed on mesh sizes (NEFMC 1994). Hall-Arber (1993) conducted a social impact assessment of Amendment 5 and noted that fishermen in New England were experiencing great anxiety and fear of the potential changes. Many fishermen did not have the economic means to adapt rapidly to the changes the industry was experiencing at this time.

Amendment 7 was adopted in 1996 because earlier effort reduction objectives were not achieved. The amendment closed 6,000 square miles of Georges Bank and increased allowable mesh sizes again. More quotas were developed for species and became more restrictive. The number of days allowed to fish decreased through DAS

regulations. Incentives were provided for those who fished exclusively with mesh size larger than the minimum required. Amendment 7 also stated that new regulations could be implemented as new data became available (NEFMC, 1996).

Under pressure from a lawsuit from the Conservation Law Foundation, in 2003 the NEFMC approved and implemented Amendment 13. Some of the changes implemented included dealer and vessel reporting requirements, new DAS systems, changed areas closed and possession limits and gear restrictions (NEFMC 2004). Those vessels that were not active in the fishery during 1996-2001 time periods were not given an allocation, and their permits were removed from the fishery (NEFMC 2004). Although some fishermen lost their permits, the total DAS allocation was also reduced under Amendment 13 (NEFMC 2004).

As of 2006, the groundfish fishery included approximately 650 vessels, utilizing 33,000 days at sea over the course of 19,000 fishing trips. (McElderry and Turris 2008). The NEFMC began developing Amendment 16 in 2006. It introduced a new attempt at a “sector management” program, a form of catch share management, which was originally introduced in Amendment 13. Amendment 16 did a complete rewrite instead of expanding on the sector program and introduced seventeen additional sectors for the commercial groundfish fishery. A sector is defined in the Amendment as

“...a group of persons (three or more persons, none of whom have an ownership in the other two persons in the sector) holding limited access vessel permits who have voluntarily entered into a contract and agree to certain fishing restrictions for a specified period of time, and which has been granted a TAC(s) in order to achieve objectives consistent with applicable FMP goals and objectives (NEFMC, 2009).”

Fishermen in a sector are granted an allocation, or Total Allowable Catch (TAC), which is based on individual catch history between the years 1996 and 2006.

The movement to sector management represented a major shift in how groundfish is managed in the Northeast, therefore creating challenges for fishermen seeking to preserve their fishing businesses and livelihoods (Olson and Pinto da Silva 2014). The first few years of sector management saw uneven accumulation of the promised benefits from the program; some are capitalizing on value-added pursuits while others are overwhelmed and didn't know where to begin with sectors (Olson and Pinto da Silva 2014). To understand social impacts of catch shares, researchers have worked to develop performance measures to identify and evaluate impacts over time in order to assess and improve sectors, and catch share management systems over time (see Clay et al. 2014 and Brinson and Thunberg 2013).

Olson and Pinto da Silva (2014) note that fishermen of different ages have faced differing challenges with sectors, with younger fishermen discouraged from entry and older fishermen concerned about being able to retire. While interviewing sector managers after implementation, one pointed out that the new fishing regulations require a new way of thinking: those who are able and willing to adapt and take a long-term view will benefit, but those who don't will lose out, and the manager worried that many fishermen are no longer willing to adapt anymore (Olson and Pinto da Silva (2014).

Understanding the theory of resilience, including the concept of social-ecological resilience, literature on age and adaptability, and resilience studies in fishing allows better understanding for the methods used in the present study. The

groundfish fishery is just one example of changes in management in New England fisheries that have forced fishermen to adapt to a continuously changing industry. The next chapter will give more detail on the methods used in this study.

CHAPTER III

METHODOLOGY

Chapter three describes the methods used in the present study to investigate the research problem and address the hypotheses presented in Chapter I.

3.1 Surveys

Structured surveys conducted with fishermen from the ports studied were used as a means of assessing and measuring their perceptions of change and their resilience to those changes.

3.1.1 Participants and sampling design

A total of 92 fishermen were interviewed from the ports of Point Judith, Rhode Island and New Bedford and Fairhaven, Massachusetts between October of 2012 and January 2013. A total of 51 interviews were conducted in Point Judith, RI and 41 in New Bedford, MA. All fishermen interviewed were currently fishing.

The sampling method used was opportunistic, approaching fishermen at the docks (Bernard 2006). Each interview was about fifteen to twenty minutes in length. The sample included owners, captains, captain/owners, as well as crew; therefore, the opportunistic approach was the best option to reach a representative sample of members of the fishing industry. A truly random study was not possible because there is no database listing all active members of the industry. Furthermore, given the nature

of fishermen's unpredictable schedules arranging interviews can be difficult. According to Pollnac and Poggie (1978) the most successful way to obtain information from fishermen is to approach them at the docks when they are working on gear, preparing for a trip, or socializing with other fishermen. Fishermen were approached at all times of the day and days of the week.

3.1.2 Measures

The questionnaire (Appendix I) was created to obtain the following information: 1) information about demographics and characteristics of participants; 2) measure of individual subjective resilience; 3) assess individual levels of job satisfaction; 4) perceptions of their future in fishing.

3.1.2.1 Resilience

Fishermen's subjective resilience was measured using a scale developed by Marshall and Marshall (2007). The researchers assessed social resilience for individual fishers in North Queensland, Australia by assessing levels of resilience by four key characteristics: their perception of risk, their ability to plan and cope and their level of interest in change. The scale used in this study was the result of a reliability analysis, where there were 17 original statements and five were removed in a step-wise manner on the basis of the size of Chronbach's α . The remaining 12 statements can be found in Table 3 below.

Table 3. Statements developed by Marshall and Marshall (2007) to measure resilience

-
1. I have many options available if I decide to no longer be a fisher
 2. I am confident that I could get work elsewhere if I needed to
 3. I am too young to retire and too old to find work elsewhere*
 4. I would be nervous trying something else*
 5. I can cope with small changes in the industry
 6. I have planned for my financial security
 7. Every time there is a change I plan a way to make it work for me
 8. I am more likely to adapt to change compared to other fishers
 9. I do not think I am competitive enough to survive much longer*
 10. I am confident things will turn out well for me
 11. If there are any more changes I will not survive much longer*
 12. I am interested in learning new skills outside of the industry
-

*Negatively worded statements were coded on a reverse scale

Fishermen participants were asked to indicate their levels of agreement with these twelve statements on a five point Likert scale (1=*strongly disagree*; 2=*disagree*; 3=*neutral*; 4= *agree*; 5=*strongly agree*). The original scale developed by Marshall and Marshall (2007) was coded on a four point Likert scale (1=*strongly agree*; 2=*agree*; 3=*disagree*; 4=*strongly disagree*). The added neutral option in this study allowed respondents to have an option to neither agree nor disagree with the statements. The neutral option was originally added in research studies in an effort to avoid false responses (Bishop 1987) so that people were not forced to choose a response that did not reflect their true beliefs (Johns 2005 and Krosnick et al. 2002). It is possible that the use of a neutral option may influence results by giving fishermen an option to respond when they do not understand the question or simply “do not know” rather than be neutral on the question.

3.1.2.2 Job Satisfaction

Job satisfaction was first assessed by Pollnac and Poggie in 1977 (Acheson et al 1980, Pollnac and Poggie 1988). Further research on job satisfaction in the U.S and Canadian fisheries by them and others was published (e.g. Gatewood and McCay 1990, Pollnac et al. 2008, Pollnac and Poggie 2006, 2008, Brinkley 1995). The job satisfaction variable was originally measured using a twenty-two item scale. The items included topics that were shown by previous research to be associated with job satisfaction among fishermen. Factor analysis was used to develop the three components of job satisfaction: *Basic Needs*, *Social and Psychological Needs*, and *Self-Actualization*. Pollnac (2010, 2011) reduced the number of indicators for each component to the three that marked the highest loadings on each component (Table 4). Doing so reduced the length of interviews while still obtaining valid data.

Table 4. Items derived from the twenty-two item scale developed by Pollnac and Poggie (1980) to measure levels of job satisfaction

-
1. Your actual earnings (from fishing)
 2. Predictability of your earnings
 3. Job safety
 4. Time spent away from home
 5. Physical fatigue of the job
 6. Healthfulness of the job
 7. Adventure of the job
 8. Challenge of the job
 9. Opportunity to be your own boss
-

Similar to the Marshall and Marshall (2007) subjective resilience scale, fishermen were asked their levels of satisfaction on a five-point Likert scale (1=*very dissatisfied*; 2=*dissatisfied*; 3=*neutral*; 4=*satisfied*; 5=*very satisfied*). The variables ‘actual earnings,’ ‘predictability of earnings,’ and ‘safety’ represent the *Basic Needs*

component; ‘adventure of the job,’ ‘challenge of the job,’ and ‘opportunity to be own boss’ the *Self-Actualization* component; and ‘time away from home,’ ‘physical fatigue of the job,’ and ‘healthfulness of the job,’ the *Social and Psychological Needs* component (Pollnac et al. 2015). Two other job satisfaction questions: “Would you advise a young person to enter fishing?” and “Would you still fish if you had your life to live over?” were also used as job satisfaction indicators and previously used by Pollnac and others. Responses to these two questions were coded as *yes, no, maybe*.

3.1.3 Additional Questions

In order to further measure individuals perceptions of the future of their personal fishing business and their attachment to the industry, additional questions were added to the survey. These additional questions included structured survey questions and open ended style questions. These questions included if they see themselves fishing in the *short term, medium term, long term* and: “if you were offered a job that promised you an income greater than you are making from fishing, would you leave fishing for that job?” If respondents answered *Yes*, they were asked: “If you were offered a job that promised you the same income that you are making from fishing now, would you leave fishing for that job? Why?”

To understand changes throughout time, fishermen were asked how their income from fishing now compares to what it was when they first began fishing on a Likert scale: *Significantly lower; lower; same; higher; significantly higher*. Also asked were two open ended questions: “What has been the biggest change(s) in the

fishing industry?” and “Have regulations had an impact on your family? How?”

These questions were coded according to categories of responses.

3.2 Analyses

Results from survey questions were analyzed using statistical tests for the appropriate measure levels using SYSTAT statistical software. The answers to the open ended questions were coded and analyzed using MAXQDA qualitative data analysis software.

CHAPTER 4

ANALYSES AND RESULTS

This chapter presents analyses of the data obtained through the use of surveys as discussed in the previous chapter. This chapter provides information necessary to evaluate the research hypotheses.

4.1 Characteristics of the Sample

4.1.1 Age and Education

The average age of the respondents for both ports was 46 (SD= 10.1). The average education level in years for New Bedford was 11.8 and Point Judith 12.9. Average age did not differ significantly between both ports ($t = -0.439$, $df = 90$, $p > 0.05$), but a comparison between average years of formal education showed statistically significant variations between New Bedford and Point Judith (12.9 versus 11.8 respectively, $t = 2.537$, $df = 90$, $p < 0.05$, pooled variance). Basic statistics for age and education for both ports separately and combined is shown in Table 5.

Table 5. Basic statistics regarding years of age and education for each port and both combined

	Point Judith (n=51)		New Bedford (n=41)		Total (n=92)	
	Age	Education	Age	Education	Age	Education
Minimum	18	9	20	4	18	4
Maximum	65	19	62	16	65	19
Median	47	12	47	12	47	12
Mean	45.2	12.9	46.1	11.8	45.6	12.4
SD	10.9	2.1	9.1	2.2	10.1	2.2

For statistical purposes, age groups that are used below in further analyses to examine differences between younger and older fishermen were developed by splitting

groups above and below the total sample mean of 45.6. See Table 6 for the distribution of each age group.

Table 6. Distribution of younger and older age groups

Age	Frequency (N)	Percent (%)
≤ 45	38	41.3
>45	54	58.7

4.1.2 Marital Status

The majority of fishermen in Point Judith and New Bedford were married (57 and 63% respectively). Chi-Square analysis did not show statistically significant differences between ports ($\chi^2 = 0.295$, $df = 1$, $p > 0.05$). For those respondents who are married, 72% of spouses have occupations. Point Judith and New Bedford had differing responses for spouses with occupations (44 and 28% respectively); this difference is not however, statistically significant ($\chi^2 = 3.466$, $df = 1$, $p > 0.05$).

4.1.3 Residency

The majority of the sample (67%) lived in the same state they fished in but in a different town. Out of the 41 respondents in New Bedford, 34% lived in the city. Forty-eight percent of respondents lived in Massachusetts but in a different town or city and the remainder lived out of state (8%). Resident states mentioned were Maine, New Jersey, Virginia, and North Carolina. For Point Judith, only 16% of the respondents lived in Narragansett, RI (the port town) and 46% live in surrounding towns within Rhode Island. All other respondents but one from Connecticut, live in surrounding towns in Rhode Island. Differences observed were statistically significant

($\chi^2 = 13.010$, $df = 2$, $p < 0.01$). The distribution of town and state residency can be seen in Appendix II.

4.1.4 Occupations besides fishing

There were similar responses between New Bedford and Point Judith (19.5 and 15.7% respectively, $\chi^2 = 0.232$, $df = 1$, $p > 0.05$) of fishermen who have occupations outside of fishing. Occupations mentioned in both ports included boat repair, construction, and carpentry. A list of all occupations mentioned can be seen in Appendix III.

4.2 Fishing Variables

4.2.1 Fishing experience

All fishermen interviewed had an overall average of 27 years fishing experience ($SD = 10.68$). Respondents had an average of 22.05 years experience in their current port and 8.06 years fishing on their current boat. Table 7 shows the years of fishing experience for each port and both ports combined, as well as years of experience in their current port and on their current vessel.

Table 7. Basic statistics for years of experience fishing, years of experience in current port, and years of experience on current boat for each port studied and both ports combined

	Point Judith			New Bedford			Total		
	Fishing	Port	Vessel	Fishing	Port	Vessel	Fishing	Port	Vessel
Minimum	2	2	0.15	2	2	0.5	2	2	0.15
Maximum	50	50	33	45	45	30	50	50	33.0
Median	28	26.5	7	30	24	3	29.5	25	4.5
Mean	26.55	24.03	8.97	27.29	22.05	7.18	26.88	23.03	8.06
SD	11.3	10.96	8.55	9.98	11.20	8.02	10.68	11.06	8.28
N	51	40*	39*	41	41	41	92	81	80

*Total sample size for these questions varies because the first ten surveys did not ask this information.

The average number of vessels fished on since respondents began fishing was 14.2 (SD= 15.17). New Bedford had a higher average number of boats fished on with 18.6 (SD=20.25). Differences observed in regard to the number of vessels fished on in New Bedford and Point Judith (18.6 and 10.7 respectively) is also statistically significant ($t = -2.514$, $df=88$, $p<0.05$, pooled variance).

4.2.2 Family involvement in fishing

The average number of generations involved in fishing for the total sample was 2.03 (SD= 1.16). For both ports the average number of relatives fishing was 1.6, with New Bedford having a slightly higher average than Point Judith. The differences in generations fished was statistically significant ($t=-2.944$, $df = 90$, $p<0.01$, pooled variance). Table 8 shows the basic statistics for the number of generations and relatives involved in fishing. Point Judith and New Bedford (49 and 63% respectively) had a difference in relatives currently fishing; but the differences are not statistically significant ($\chi^2 = 1.906$, $df = 1$, $p>0.05$).

Table 8. Basic statistics for the number of generations involved in fishing and number of relatives involved in fishing for each port and both ports.

	Point Judith		New Bedford		Total	
	Generations	Relatives	Generations	Relatives	Generations	Relatives
Minimum	1	0	1	0	1	0
Maximum	4	8	5	12	5	12
Median	1	0	2	1	2	1
Mean	1.73	1.29	2.42	1.90	2.03	1.57
SD	1.00	1.88	1.25	2.52	1.16	2.20
N	51	51	41	41	92	92

4.2.3 Fishery position

For both ports combined, the position with the highest total (n=30) was ‘captain/owners’ and ‘captain’ (n=27), followed by ‘crew/mate’ (n=17). Table 9 shows the distribution between positions in each port and Figure 2 shows a visual distribution of the positions in each port.

Table 9. Distribution of the different fishery positions in the two ports studied and both ports combined

	Point Judith	New Bedford	Total
Captain/owner & owner	24 (47.1%)	6 (14.6%)	30 (32.6%)
Captain	9 (17.6%)	18 (43.9%)	27 (29.3%)
Crew/ mate	18 (35.3%)	17 (41.5%)	35 (38.0%)
Total	51	41	92 (100%)

Figure 3. Distributions of position in fishery for Point Judith and New Bedford

Table 10 shows the younger and older age groups divided into each age group and position. The data shows more ‘captain/owners’ that are above 45 (n=20) than 45 and below (n=7) in both ports. There are also more older generation ‘captain’ respondents (n=19) than there are younger (n=8). There are more respondents that are ‘crew’ and ‘mate’ that are 45 and below (n=22) than above 45 (n=13). Differences

between age groups for position were statistically significant ($\chi^2 = 6.490$, $df = 2$, $p < 0.05$).

Table 10. Distribution of the different fishery positions in the two ports studied and both ports combined separated by younger and older age groups.

Position	Point Judith		New Bedford		Total	
	≤ 45	> 45	≤ 45	> 45	≤ 45	> 45
Captain/Owner & Owner	7 (30.4%)	17 (60.7%)	1 (6.7%)	5 (19.2%)	8 (21.1%)	22 (40.7%)
Captain	3 (13.0%)	6 (21.4%)	5 (33.3%)	13 (50.0%)	8 (21.1%)	19 (35.2%)
Crew/ Mate	13 (56.5%)	5 (17.9%)	9 (60.0%)	8 (30.8%)	22 (57.8%)	13 (24.1%)
Total	23 (100%)	28 (100%)	15 (100%)	26 (100%)	38 (100%)	54 (100%)

4.3 Characteristics of current fishing activity

4.3.1 Primary species fished

The primary species fished varied by port. Tables 11 and 12 show primary and secondary species mentioned by respondents in Point Judith and New Bedford respectively. New Bedford had a larger amount of scallops primarily targeted compared to Point Judith. Point Judith fishermen mentioned squid and scup as a primary species more frequently than New Bedford. The distribution of all species fished can be seen in Appendix IV.

Table 11. Fishermen's primary and secondary species landed for Point Judith, RI

Primary Species (N=40)	%	Secondary Species* (N=38)	%
Squid	37.5	Fluke	23.7
Scup	15.0	Scup	18.4
Lobster	10.0	Lobster	15.8
Crab	10.0	Groundfish	10.5
Skates	10.0	Squid	7.9
Whiting	5.0	Whiting	7.9
Fluke	5.0	Crab	5.3
Groundfish	2.5	Skates	2.6
Squid and Scup (equal)	2.5	Monkfish	2.6
Scallops	2.5	Squid and Scup (equal)	2.6
		None	2.6
Total	100.0	Total	100.0

Table 12. Fishermen's primary and secondary species landed in New Bedford, MA

Primary Species	%	Secondary Species	%
Scallops	43.9	None	24.4
Flounder	9.8	Monkfish	21.9
Haddock	7.3	Cod	12.2
Squid	4.9	Lobster	4.9
Lobster	4.9	Crab	4.9
Winter Flounder	4.9	Scallops	4.9
Quahog	4.9	Yellowtail	4.9
Cod	2.5	Surf Clams	4.9
Crab	2.4	Flounder	4.9
Groundfish	2.4	Fluke	2.4
Skates	2.4	Groundfish	2.4
Depends	2.4	Conch	2.4
Conch	2.4	Pollock	2.4
Surf Clams	2.4	Depends	2.4
Redfish	2.4		
Total	100.0	Total	100.0

4.3.2 Number of species targeted

The total number of species targeted varied by port. The distribution of the number of species by each port is shown below (Table 13). Differences between ports were statistically significant ($t = 3.821$, $df = 86$, $p < 0.001$) as more fishermen in New Bedford target only one species than Point Judith (51.2 and 10.6% respectively). The majority of Point Judith (89.4%) target at least two or more species.

Table 13. Distribution of the number (N) of species fishermen fish for.

N of species	Point Judith	New Bedford	Total
1	5 (10.6%)	21 (51.2%)	26 (29.5%)
2	11 (23.4%)	10 (24.4%)	21 (23.9%)
3	11 (23.4%)	2 (4.9%)	13 (14.8%)
4	7 (14.9%)	3 (7.3%)	10 (11.4%)
5	3 (6.4%)	2 (4.9%)	5 (5.7%)
6	6 (12.8%)	3 (7.3%)	9 (10.2%)
7	2 (4.3%)	-	2 (2.3%)
8	1 (2.1%)	-	1 (1.1%)
11	1 (2.1%)	-	1 (1.1%)
Total	47	41	88*

*4 missing data

4.3.3 Gear type

Over half of the respondents mentioned nets as their primary gear type, followed by dredge. The distribution of primary gear types is shown in Table 14. To account for low responses, the *net gear* category includes the gear types: trawl nets and gillnet; the category *traps* includes lobster traps; the category *Dredge* is scallop dredge and hydraulic dredges (clams & ocean quahogs).

Table 14. Distribution of primary gear type

	Point Judith	New Bedford	Total
Nets	37 (73%)	16 (39.0%)	53 (57.6%)
Traps	13 (25%)	3 (7.3%)	16 (17.4%)
Dredge	1 (2%)	22 (53.7%)	23 (25.0%)
Total	51	41	92 (100%)

There was more net gear mentioned in Point Judith than in New Bedford (66.7 and 34.1% respectively) as well as traps (25.5 and 7.3% respectively). Differences in gear type by port were statistically significant ($\chi^2 = 33.048$, $df = 2$, $p < 0.001$).

Differences were found in age groups with dredge gear having a higher percentage (54%) for the older generation; results however were not statistically significant ($\chi^2 = 5.452$, $df = 2$, $p > 0.05$). Distribution of gear by age group can be found in Appendix V.

4.3.4 Sector management

More respondents from Point Judith belonged to a sector than New Bedford (73.3 and 34.1% respectively). The distribution of answers are shown in Table 15.

Differences between ports were statistically significant ($\chi^2 = 10.643$, $df = 1$, $p < 0.01$).

Table 15. Distribution of the number and percent of boats that belong to a sector by each port and both combined.

	Point Judith	New Bedford	Total
Yes	22 (73.3%)	14 (34.1%)	36 (50.7%)
No	8 (26.7%)	27 (65.9%)	35 (49.3%)
Total	30	41	71 (100%)

* Question was not asked the first set of surveys and 'don't know' (n=3) was taken out for analysis

4.3.5 Crew size

The average crew size in Point Judith was lower than New Bedford (2.8 and 5.33 respectively). Both ports combined had an average of 4.1 crew. The differences

between ports were statistically significant ($t = -7.722$, $df = 77$, $p < 0.01$, pooled variance). Table 16 shows the basic statistics for crew size for each port and both combined.

Table 16. Basic statistics for crew size in each port and both port combined.

	Point Judith	New Bedford	Total
Minimum	1	2	1
Maximum	6	7	7
Median	3	5	4
Mean	2.80	5.33	4.11
SD	1.19	1.66	1.92
N	38	41	79

4.3.6 Trip length

The average trip length in days was also lower in Point Judith than New Bedford (3.3 and 7.9 days respectively). The differences between both ports was statistically significant ($t = -6.477$, $df = 89$, $p < 0.001$, pooled variance). Table 17 shows the basic statistics for trip length for each port and both ports combined.

Table 17. Basic statistics for trip length in days for each port and both port combined.

	Point Judith	New Bedford	Both ports
Minimum	0.15	0.5	0.15
Maximum	15	12	15
Median	3	9.75	5
Mean	3.26	7.89	5.29
SD	2.95	3.87	4.08
N	51	41	91

4.3.7 Income from fishing

Fishermen were asked to give their annual income from fishing using the 2010 census categories shown below in Table 18 with their corresponding codes. The

average income code for the total sample was 10.9 (SD=3.51), which falls between the census income categories \$50,000-59,999 and \$60,000-\$74,999 per year. Table 19 shows basic statistics for each port and both ports combined for annual income. New Bedford income was higher than Point Judith (mean census code of 12.8 and 9.55 respectively) with the port falling between the census category \$75,000-\$90,000 and \$100,000-\$124,999 per year and Point Judith between \$45,000-\$44,999 and \$50,000-\$59,999. A non-parametric Mann-Whitney U test shows a statistically significant difference between the two ports (U=433.5, df= 1, p<0.001).

Table 18. Census designated income categories and the corresponding category code.

Code	Category
1	Under 10,000
2	10,000-14,999
3	15,000-19,999
4	20,000-24,999
5	25,000-29,999
6	30,000-34,999
7	35,000-39,999
8	40,000-44,999
9	45,000-49,999
10	50,000-59,999
11	60,000-74,999
12	75,000-99,999
13	100,000-124,999
14	125,000-149,000
15	150,000-199,999
16	Over 200,000

Table 19. Basic statistics for annual income for each port and both port combined using census-designated categories

	Point Judith	New Bedford	Total
Minimum category	2	5	2
Maximum category	16	16	16
Median category	10	14	12
Mean category	9.55	12.83	10.99
SD	3.12	3.14	3.51
Total	51	40	91

4.3.7.1 Income categories by age group

The distribution (N) of both age groups by port and income category is shown below (Figure 3). The blue (≤ 45) and red (>45) both represent Point Judith, RI. The green (≤ 45) and purple (>45) represent New Bedford, MA. The figure shows there are more fishermen in the lower income categories in Point Judith than there are in New Bedford for all ages. There are also more respondents in the younger generation in the lower income categories for Point Judith than there are in the higher income categories. In New Bedford however, the younger generation has more respondents in the higher income categories than in the lower categories. For the total sample, using the Mann-Whitney U test, there was no statistically significant difference between age groups and income categories ($U = 905.5$, $df = 1$, $p > 0.05$).

Figure 4. The total number of respondents for each income category by age group for each port separately.

4.3.7.2 Income categories by gear type

Income categories by gear type showed statistically significant differences between gear type and income using Kruskal-Wallis test ($\chi^2 = 34.290$, $p < 0.001$). Table 20 shows Basic Statistics of the three gear types for each income Census category (shown in Table 18). The mean for dredge gear (Mean=14.4) was higher than both nets and traps (Mean= 10.1 and 8.9 respectively).

Table 20. Basic statistics of the three gear types for each income Census category.

	Net	Trap	Dredge
Minimum category	2	4	10
Maximum category	16	13	16
Median category	10.5	10	15
Mean category	10.1	8.9	14.4
SD	3.3	3.0	1.7
Total	52	16	23

*One respondent refused to answer income question

4.4. Job Satisfaction variables

The nine item job satisfaction scale developed by Pollnac et al. (2014) and presented in Chapter III was used to develop the three component groupings of job satisfaction (basic needs, social and psychological needs, and self-actualization). The different components of job satisfaction were developed by summing up the indicators for each category. The “social and psychological needs” component includes *time spent away from home, physical fatigue of the job, and healthfulness of job*. The “self actualization” component includes *adventure of the job, challenge of the job, and opportunity to be own boss*. The “basic needs” component includes *your actual earnings, predictability of earnings, and job safety* (Pollnac et al, 2015). The three components were calculated by summing the response variables for each category, resulting in a range from 3-15. Descriptive statistics for all three factors of job satisfaction are shown in Table 21.

Table 21. Descriptive statistics of the three components of job satisfaction

	Basic needs	Social & Psychological needs	Self-actualization
Mean	10.250	9.609	12.793
SD	2.630	2.463	1.861
Maximum	15.000	13.000	15.000
Minimum	3.000	3.000	7.000
N of cases	92	92	92

4.4.1. Job satisfaction and age groups

The different components of job satisfaction were compared among the different age groups in order to test the hypothesis that levels of job satisfaction are different between older and younger generation fishers. As noted above, the different age groups were developed by splitting the sample above and below the mean value of

45.4. A two sample T-test does not reveal a statistically significant difference between the two age groups concerning the *basic needs* ($t = -1.252$, $df = 90.0$, $p > 0.05$, pooled variance) factor. However, both *social and psychological needs* ($t = -2.581$, $df = 90.0$, $p < 0.05$, pooled variance) and the *self-actualization* ($t = -2.226$, $df = 90.0$, $p < 0.05$, pooled variance) factor revealed statistically significant differences across the two age groups. See Table 22 for the difference in means of the three components for each age group.

Table 22. Mean for each component score by age group

Age	Basic Needs	Social and Psychological Needs	Self- Actualization
≤ 45	9.8	8.8	12.2
> 45	10.5	10.1	13.2
	$t = -1.252$, $df = 90.0$, $p > 0.05$	$t = -2.581$, $df = 90.0$, $p < 0.05$	$t = -2.226$, $df = 90.0$, $p < 0.05$

4.4.2 Job satisfaction and ports

The two ports studied were compared across the three job satisfaction components. Both ports presented similar mean values with their levels of job satisfaction for each component and results of the two sample T-tests were not statistically significant for all three components of job satisfaction. Table 23 shows the means for each component for both ports and test results.

Table 23. Means of each Job Satisfaction component for levels of job satisfaction in each port

Port	Basic Needs	Social and Psychological Needs	Self- Actualization
Point Judith	9.8	8.8	12.8
New Bedford	10.5	10.1	12.8
	$t = -1.506$, $df = 90.0$, $p > 0.05$	$t = 1.105$, $df = 90.0$, $p > 0.05$	$t = -0.052$, $df = 90.0$, $p > 0.05$

4.4.3 Job satisfaction and gear types

Levels of job satisfaction for each of the three components were compared across different gear types: (1) net, (2) trap, and (3) dredge. Analyses of variance comparing the three gear categories with job satisfaction components showed statistical significance for only the *Basic Needs* component ($f = 34.243$, $df = 20$, $p < 0.05$). Post hoc analyses of the *Basic Needs* showed statistically significant differences between the categories *net* and *dredge gear* (mean difference = -2.419 , $p < 0.01$) and between the categories *traps* and *dredge gear* (mean difference = -3.049 , $p < 0.01$). Figure 4 shows the three job satisfaction components and the mean for each gear types.

Figure 5. Distribution of the mean for each gear type and component of job satisfaction

4.4.4 Additional job satisfaction questions

In addition to the job satisfaction component scale, fishermen were asked about their willingness to become a fisherman if they had their lives to live over and

whether they would recommend a younger person to become a fisherman. For the latter question, the overall responses (62%) were negative. Pearson's Chi-square analysis comparing the two ports with regard to yes/no responses was not statistically significant ($\chi^2 = 0.585$, $df=1.0$, $p>0.05$). Distribution of responses can be seen in Table 24.

Table 24. Distribution of the answer to the question advise young to enter fishing

	Point Judith	New Bedford	Total
No	28 (62.2%)	26 (70.3%)	54 (65.9%)
Yes	17 (37.8%)	11 (29.7%)	28 (34.1%)
Total	45	37	82*(100%)

($\chi^2 = 0.585$, $df=1.0$, $p>0.05$)

*Responses 'maybe/depends' taken out for low sample sizes

To understand fishermen's attachment to the industry, participants were asked 'if you had your life to live over, would you still fish'. For both ports combined, 66.3% would fish if they had their life to live over. There were similar responses in both ports ($\chi^2 = 0.095$, $df= 1.0$, $p>0.05$), with the majority in Point Judith and New Bedford (64.7 and 68.3% respectively) stating they would fish if they had their life to live over. The distribution of results between both ports separately and combined can be seen in Table 25.

Table 25. Distribution of the answer to the question would you still fish if you had your life to live over.

	Point Judith	New Bedford	Total
No	15 (31.2%)	11 (28.2%)	26 (29.9%)
Yes	33 (68.8%)	28 (71.8%)	61 (70.1%)
Total	48	39	87* (100%)

$\chi^2 = 0.095$, $df= 1.0$, $p>0.05$

*Responses 'maybe/depends' taken out for low sample sizes

Another question asked to understand fishermen's attachment to the industry, was about their willingness to leave given the opportunity to have a job that pays more than fishing. More respondents stated they would leave fishing if they were given a

job that had greater income than fishing (44.9% for both ports). There were 43.3% of respondents in Point Judith that said they would leave fishing and the same percentage said “maybe/depends.” More people in New Bedford said they would not leave fishing for income that is greater (28.2%) than Point Judith (13.3%). Difference between ports ($\chi^2 = 3.347$, $df = 2$, $p > 0.05$), age groups ($\chi^2 = 4.800$, $df = 2$, $p > 0.05$), and gear groups ($\chi^2 = 4.408$, $df = 4.0$, $p > 0.05$) were not statistically significant. Table 26 gives the distribution of responses by port. The distribution of the responses by age group and gear type can be found in Appendix VI.

Table 26. Percentages (%) of the answer to the question would leave fishing for a job that promised you greater income than fishing.

	Point Judith	New Bedford	Total
Yes	13 (43.3%)	18 (46.2%)	31 (44.9%)
No	4 (13.3%)	11 (28.2%)	15 (21.7%)
Maybe/Depends	13 (43.3%)	10 (25.6%)	23 (33.3%)
Total	30	39	69 (100%)

$\chi^2 = 3.347$, $df = 2$, $p > 0.05$

For those who answered *yes* or *maybe/depends* to the above question they were then asked “If you were offered a job that promised you the *same* income that you are making from fishing now, would you leave fishing for that job?” Point Judith had an even split between *yes*, *no* and *maybe/depend*. New Bedford had the majority of participants answer *yes*, they would leave fishing for the same income (Table 27).

Table 27. Percentages (%) of the answer to the question would you leave fishing for a job that offered you the same income as fishing.

	Point Judith	New Bedford	Total
Yes	7 (33.3%)	15 (53.6%)	22 (44.9%)
No	7 (33.3%)	5 (17.9%)	12 (24.5%)
Maybe/Depends	7 (33.3%)	8 (28.6%)	15 (30.6%)
Total	21	28	49 (100%)

4.5 Resilience variables

4.5.1 Factor analysis

The twelve resilience statements developed by Marshall and Marshall (2007) and presented in Chapter III were asked to each fisherman. The number (N) for each response to the twelve statements is shown in Table 28.

Table 28. N of each response for Marshall and Marshall (2007) twelve resilience statements.

Statement	1	2	3	4	5
I have many options available if I decide to no longer fish	30	24	10	23	5
I am confident that I could get work elsewhere if I needed to	10	14	9	39	20
I am too young to retire and too old to find work elsewhere*	16	24	19	23	10
I would be nervous trying something else*	20	29	10	23	10
I can cope with small changes in the industry	7	10	11	53	11
I have planned for my financial security	8	23	15	37	9
Every time there is a change I plan a way to make it work for me	4	8	14	48	17
I am more likely to adapt to change compared to other fishers	2	11	23	40	16
I do not think I am competitive enough to survive much longer*	38	32	11	10	1
I am confident things will turn out well for me	4	11	18	41	18
If there are any more changes I will not survive much longer*	5	14	20	28	25
I am interested in learning new skills outside of the industry	11	21	17	27	16

1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree

*negatively worded statements

The 12 variables were reduced using principal component factor analysis with varimax rotation. Variables pertaining to each category of resilience include *Perception of risk in approaching change*, *Adaptation to change: the ability to plan, learn, and reorganize*, and the *Ability to cope with change* based on the characteristics of the variables with the highest factor loadings for each component. The results differ from Marshall and Marshall (2007) where the variables were reduced into four components. Table 29 shows the factor loadings for all resilience variables and the highest loadings for each variable are highlighted. Factor loadings above 0.40 were assigned to the factor on which they loaded highest.

Table 29. Results of a factor analysis involving the twelve resilience variables

	Perceptions of Risk	Ability to Cope	Adaptation to Change
I have many options available if I decide to no longer fish	0.708	0.034	-0.093
I am confident that I could get work elsewhere if I needed to	0.716	0.201	0.047
I am too young to retire and too old to find work elsewhere*	-0.745	-0.170	0.218
I would be nervous trying something else *	0.671	-0.268	0.325
I can cope with small changes in the industry	-0.059	0.049	0.707
I have planned for my financial security	-0.005	0.553	-0.054
Every time there is a change I plan a way to make it work for me	0.119	0.292	0.610
I am more likely to adapt to change compared to other fishers	0.422	0.325	0.399
I do not think I am competitive enough to survive much longer*	0.017	0.608	0.283
I am confident things will turn out well for me	0.218	0.767	-0.105
If there are any more changes I will not survive much longer*	0.089	0.585	0.201
I am interested in learning new skills outside of the industry	0.364	0.201	-0.499
Eigenvalues	2.403	1.879	1.579
Total variance explained (%)	20.026	15.658	13.158

*Data for negatively worded statements were reversed prior to analysis.

There were a few differences with the results found in Marshall and Marshall (2007). The variables “I can cope with small changes in the industry” was grouped with the components of *Perception of Risk* in Marshall and Marshall (2007); “I have planned for my financial security” and “I am more likely to adapt to change compared to other fishers” was grouped in *The Ability to Plan, learn and reorganize*. Lastly, the variable “I am interested in learning new skills outside of the industry” formed a single variable component in the study done by Marshall and Marshall (2007) under their *Interest in adapting to change*” and was grouped here under the *Adaptation to change: the ability to plan, learn and reorganize*. Factor scores were computed using SYSTAT and were used for further analysis below.

4.5.2 Resilience and age groups

To test the hypothesis that resilience levels differ between the younger and older generation, the age groups were compared with each of the three resilience components. Both age groups presented similar mean values in their levels of resilience and none of the factors of resilience presented statistical significant results suggesting there is no difference in the respondent level of resilience between age groups (Table 30).

Table 30. Mean values of factor scores for resilience components for both age groups

	Perceptions of Risk	Ability to Cope	Adaptation to change
≤ 45	0.183	-0.091	-0.166
>45	-0.131	0.066	0.119
	$t = 1.484, df = 89.0, p > 0.05$	$t = -0.737, df = 89.0, p > 0.05$	$t = -1.350, df = 89.0, p > 0.05$

4.5.3 Resilience and ports

Both ports studied were compared on their levels of resilience for each of the three components. Both ports presented similar mean values and the results of a two sample T-test showed no significant difference between the ports for each component of resilience. The mean values for each port and resilience component is shown in Table 31.

Table 31. Mean values for each port and resilience components

	Perceptions of Risk	Ability to Cope	Adaptation to change
Point Judith	-0.048	0.004	-0.078
New Bedford	0.059	-0.004	0.095
	$t = -.506, df = 89.0, p > 0.05$	$t = 0.038, df = 89.0, p > 0.05$	$t = -0.822, df = 89.0, p > 0.05$

4.5.4 Resilience and gear types

The different gear types were also compared with the three components of resilience (Figure 5). The three gear types as presented in job satisfaction analyses, (1) *net*, (2) *trap*, and (3) *dredge* were shown to have statistically significant difference for the *Ability to Cope* component ($f=5.175$, $df = 88$, $p<0.01$). Post hoc analyses showed statistically significant differences between *net* and *dredge* gear ($p=0.025$, $p<0.05$).

Figure 6: Distribution of the mean for each gear type and component of resilience.

4.5.5 Additional resilience questions

To understand participants' ability to sustain their business into the future, they were asked "do you see yourself still fishing in the short, medium, or long term." The majority of participants still saw themselves fishing in the long term for both ports combined (61%). Results of Mann-Whitney U analysis of variance test shows no statistical significance between age groups and the *short*, *medium*, or *long term* responses ($U = 682.0$, $df = 1$, $p > 0.05$). Analysis was also performed between port and gear type with no statistical difference also shown for both ($U = 598.5$, $df = 1$, $p > 0.05$).

and $\chi^2 = 5.613$, $df = 2$, $p > 0.05$ respectively). A distribution of responses by age group can be seen in Table 32 and distribution by port and gear type in Appendix VII.

Table 32. Percentages (%) of the answer to the question do you see yourself fishing for short, medium, or long term by age group.

	≤ 45	> 45	Total
Short term	4 (14.3%)	11 (26.8%)	15 (21.7%)
Medium term	4 (14.3%)	8 (19.5%)	12 (17.4%)
Long term	20 (71.4%)	22 (53.7%)	42 (60.9%)
Total	28	41	69 (100.0%)
			$\chi^2 = 2.295$, $df = 1$, $p > 0.05$

Respondents were asked their reasoning for the choice they made to the above question. The most common response for those that answered in the *short term* was ‘changes in industry/regulations/harder to make a living’ (N=7, 53.8%). The most common response for *medium term* was ‘age/retirement/physical health/doing it too long’ (N=5, 45.5%) and ‘changes in industry/regulations/harder to make a living’ (N=4, 36.4%). For those that answered *long term*, the most common response was “All I know/My life” (N=11, 28.9%) with ‘like it/enjoy it’ and ‘provides good income/provide for family’ the second most common responses (N=7, 18.4%). A distribution of all responses by age group can be found in Appendix VII.

Fishermen were also asked if regulations had an influence on their family and how. The majority (71%) said that regulations do influence their family and the number one reason why they do is ‘income’ (72%) with ‘stress to family/personal health’ being the second most mentioned (15%).

Fishermen were asked how their income from fishing now compares to what it was when they first began fishing. Participants were asked on a scale of 1-5; from *significantly lower*, *lower*, *same*, *higher*, *significantly higher*. The distribution of responses for each port are shown in Table 33. Point Judith fishermen had a lower

mean average for responses than New Bedford fishermen (Mean=2.5 and 3.7 respectively). A Mann-Whitney U test showed statistically significant differences between ports ($U=318.5$, $df = 1$, $p<0.01$).

Table 33. Distribution of responses for changes in income since began fishing for each port

	Point Judith	New Bedford	Total
Significantly lower	8 (26.7%)	5 (12.8%)	13 (18.8%)
Lower	9 (30.0%)	4 (10.3%)	13 (18.8%)
Same	6 (20.0%)	7 (17.9%)	13 (18.8%)
Higher	4 (13.3%)	4 (10.3%)	8 (11.6%)
Significantly Higher	3 (10.0%)	19 (48.7%)	22 (68.1%)
Total	30	39	69 (100%)

Responses did not have statistically significant differences between age groups ($U= 515.5$, $df = 1$, $p>0.05$). However, the results between gear groups did show statistically significant differences ($\chi^2 = 33.881$, $df = 2$, $p<0.001$). Distribution of those results are shown in Table 34. Almost half (49%) of those fishing net gear mentioned a decrease in income since they began fishing on the *significantly lower* or *lower* scale. Just over 90% of dredge fishermen said their income increased since they began fishing, with 74% saying *significantly higher*.

Table 34. Distribution of the change in income since participant began fishing by gear type

	Net	Trap	Dredge	Total
Significantly lower	9 (24.3%)	4 (44.4%)	0 (0.0%)	13 (18.8%)
Lower	9 (24.3%)	4 (44.4%)	0 (0.0%)	13 (18.8%)
Same	11 (29.7%)	0 (0.0%)	2 (8.7%)	13 (18.8%)
Higher	3 (8.1%)	1 (11.1%)	4 (17.4%)	8 (11.6%)
Significantly Higher	5 (13.5%)	0 (0.0%)	17 (73.9%)	22 (68.1%)
Total	37	9	23	69 (100%)

When asked if fishermen keep up to date on fishery issues/ changes, 78.3% said yes. Those that do keep up to date were asked to choose from a list all the

sources of information they use. The most popular response was magazines (67%) and the least mentioned response was internet (14.4%).

Fishermen were asked ‘what has been the biggest change in the fishing industry since you began fishing. The number one change for both the younger and older generation was ‘regulations’ (73%). New technology/modernization was mentioned as a major change by the older generation, but not the younger. The majority of people that mentioned ‘Environmental/Species Changes/ Climate Change’ were from the older generation. Despite some of these differences, results were not statistically significant between age groups ($U=318.5$, $df = 7$, $p>0.05$). The number of responses for each category by age group can be found in Appendix VIII.

4.6 Correlation between variables

Pearson Correlation analysis was used to understand the relationship between the various independent variables and fishery variables and the dependent resilience variables: *Perceptions of Risk*, *Ability to Cope*, and *Ability to Adapt*. Results of the analysis for the total sample are shown in Table 35.

Table 35. Pearson Correlation matrix of independent variables with dependent resilience variables for the total sample.

	Perceptions of Risk	Ability to Cope	Adaptation to Change
Age	-0.242*	0.039	0.141
Age Groups	-0.155	0.078	0.142
Port	0.054	-0.004	0.087
Crew size	0.006	0.245*	0.030
Position	0.107	-0.124	-0.142
Sector Involvement	-0.111	-0.179	-0.011
Trip length	0.008	0.019	0.033
Fishing experience	-0.216*	0.055	0.130
N of species targeted	-0.123	-0.175	-0.064
Education	0.103	0.035	-0.022
N of Generations	-0.054	-0.040	0.117
Marital Status	-0.006	-0.033	0.008
Annual Income	-0.041	0.333**	0.120
Income Change	0.043	0.405**	-0.168
Advise Young	0.140	0.340**	0.168
Fish If life over	-0.009	0.138	0.212*
Social & Psych Needs	0.112	0.096	0.123
Self- Actualization	-0.002	0.193	0.198
Basic Needs	0.088	0.448***	0.074

*p<0.05

**p<0.01

***p<0.001

Perception of Risk was correlated with the “age” variable (but not with the age dichotomy) and “fishing experience.” There was a significant correlation between the *Ability to Cope* and “Crew size,” “Income,” “Income change,” “Advise young,” and “Basic Needs” variables. The *Adaptation to Change* variable was significantly correlated with “Fish if you had your life to live over” variable only.

4.6.1 Between port differences in correlations

A Pearson’s correlation matrix shows differences between Point Judith and New Bedford. Table 36 shows results for Point Judith. The *Ability to Cope* is correlated with “Annual Income,” “Income change,” “Advise Young,” and “Basic Needs.” *Adaptation to Change* is correlated with “Age,” “Age groups,” “Advise young to enter fishing,” “Fish if had life to live over,” “Social and Psychological Needs,” and “Basic Needs.”

Table 36. Pearson Correlation matrix of independent variables with dependent resilience variables for Point Judith

	Perceptions of Risk	Ability to Cope	Adaptation to Change
Age	-0.215	-0.028	0.278*
Age Groups	-0.228	-0.061	0.341**
Crew size	-0.005	0.204	0.013
Position	0.183	-0.173	-0.199
Sector Involvement	0.271	-0.114	-0.029
Trip length	0.026	0.141	-0.043
Fishing experience	-0.251	0.066	0.268
N of species targeted	0.002	0.005	-0.178
Education	0.078	-0.015	-0.081
N of Generations	-0.008	0.104	0.141
Marital Status	-0.048	-0.136	-0.199
Annual Income	-0.164	0.347*	0.184
Income Change	0.211	0.605**	-0.275
Advise Young	0.063	0.335*	0.366**
Fish If life over	-0.180	0.162	0.351*
Social & Psych Needs	-0.143	0.078	0.337*
Self- Actualization	-0.170	0.172	0.166
Basic Needs	-0.162	0.510***	0.330*

*p<0.05

**p<0.01

***p<0.001

Table 37 shows correlations between the resilience variables and independent variables for the port of New Bedford. There are statistically significant correlations between *Perception of Risk* and “Sector Involvement,” “Number of species targeted,” “Social and Psychological Needs,” and “Basic Needs.” The *Ability to Cope* had statistically significant correlations between the “Crew Size,” “Number of species targeted,” “Annual Income,” “Advise young to enter fishing,” and “Basic Needs.”

Table 37. Pearson Correlation matrix of independent variables with dependent resilience variables for New Bedford

	Perceptions of Risk	Ability to Cope	Adaptation to Change
Age	-0.294	0.133	-0.102
Age Groups	-0.082	0.244	-0.163
Crew size	-0.037	0.385*	-0.081
Position	0.058	-0.088	-0.076
Sector Involvement	-0.316*	-0.258	0.110
Trip length	-0.072	-0.062	0.011
Fishing experience	-0.180	0.041	-0.097
N of species targeted	-0.326*	-0.460**	0.269
Education	0.167	0.087	0.108
N of Generations	-0.135	-0.169	0.049
Marital Status	0.003	0.024	0.127
Annual Income	0.029	0.433**	-0.038
Income Change	0.011	0.258	-0.182
Advise Young	0.242	0.348*	-0.099
Fish If life over	0.188	0.112	0.007
Social & Psych Needs	0.394*	0.114	-0.124
Self- Actualization	0.165	0.214	0.241
Basic Needs	0.340*	0.397*	-0.287

*p<0.05

**p<0.01

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This final chapter provides a discussion of the results presented in the previous chapter together with discussion of the research question and hypotheses that were the basis of the present study. Other important findings are also presented in this chapter and conclusions drawn from the findings throughout this study.

5.1 Primary Findings

The findings in this study provide interesting insights on issues involving the perceived social impacts of fisheries management and how fishermen of different age groups and generations perceive they would handle change. Two ports were studied, both found to have differing characteristics, which can allow better understanding of how management changes affect fishing communities.

5.1.1 Characteristics of Point Judith and New Bedford

Results from the study show the two ports Point Judith, RI and New Bedford, MA are distinct from each other in many characteristics in regard to their fishing activities. New Bedford has a significantly higher amount of large offshore vessels, with longer offshore trips than Point Judith. The average trip length is 9.75 days with a higher average of crew per vessel (mean= 5.2). According to data from NOAA Fisheries (2014), 71% of vessels in New Bedford are more than 70 feet in length. The port of New Bedford has had the highest value landed for years, due to the prevalent

scallop industry. The majority of species landed for New Bedford fishermen surveyed was scallops with the use of dredge as the number one used gear. New Bedford also had the majority (51.2%) of fishermen fishing only one species. The majority of fishermen in New Bedford were captains and crew/mates. There were no vessel owners and a low number of captain/owners (14.6%) in the New Bedford sample where, most likely, fishermen worked on vessels belonging to shore owners. As expected New Bedford had the higher annual income with the average income being between the census categories of \$75,000-\$99,000 and \$100,000-\$124,999. The higher income opportunity in New Bedford likely accounts for the out of state fishermen in New Bedford (17%), as more fishermen are attracted to the port and come from out of state to fish on a more lucrative scallop vessel.

Differing from New Bedford, Point Judith has smaller average vessel sizes, where fishermen averaged a crew size of 2.8. According to data by NOAA Fisheries (2014), 65% of vessels were less than 50 feet in length. There are both offshore vessels as well as an abundance of inshore day boat fishermen. They are making relatively shorter trips than New Bedford, with the average trip length being 3 days. The majority of fishermen in Point Judith use net gear (67%) with squid and scup being their highest mentioned primary species and a variety of different secondary species, i.e., the state managed Fluke fishery, lobster, and groundfish. The majority of Point Judith fishermen (66%) fish at least three or more species, with only 11% targeting only one. It is likely that Point Judith has a “less corporate” influence compared to New Bedford with most respondents being captain/owners. The average

income for Point Judith was significantly lower than New Bedford, between the \$45,000-\$49,999 and \$50,000-\$54,999 census income categories.

5.1.2 Perceptions of Management

The biggest change that fishermen have seen in the industry for both the younger and older generation was ‘regulations’ (73%). Impacts from regulations were perceived to negatively influence families in 71% of the sample with ‘income’ (72%) being the biggest impact. In Pollnac et al. (2011) fishermen stated the most significant change due to regulations was changes in income. The following statements demonstrate the perceived effects that management has had on income and families in the present study:

“It’s stressful not knowing what they are going to do next. My wife went back to work.” –crew, 44 years old, dredge gear, personal communication, New Bedford

“We don’t make enough money. Good thing my wife is a nurse, health insurance is up.” – Captain/owner, 44 years old, net gear, personal communication, Point Judith

5.1.3 Hypothesis I

The first hypothesis developed in this study states that younger fishermen perceive themselves to be able to adapt more than the older generation of fishermen. It was predicted that the younger generation is entering an industry during a different time and political state of the fishery than those who have fished for decades and have had to adjust to the management intervention of fishery resources. Therefore, their perceptions on their ability to adapt may have been more positive to management changes. This hypothesis cannot be confirmed for the total sample through the resilience survey results, as there was no statistical difference overall between the

younger (≤ 45 years of age) and older (>45 years of age) fishermen and their ability to adapt using the Marshall and Marshall (2007) resilience scale.

Although age and adaptability literature is mixed on whether people of different ages adapt differently, there are a number of studies that have found no correlation with age and adaptability (McCrae 1982, Billings & Moos 1981, Folkman & Lazarus 1980, Ilfield 1980, O'Connell et al 2008). Rogers (2003) discusses adaptability to an 'innovation' or an "idea, practice or object that is perceived as new by an individual" (Rogers 2003:12). Studies analyzed by the author found that earlier adopters are no different from later adopters in age. There were a few studies within Rogers (2003) that found earlier adopters are younger and some indicated they were older but overall the relationship of age was inconsistent.

Although results of the subjective resilience scale (Marshall and Marshall 2007) did not show differences in age, results of correlation analysis showed the *Perception of Risk* component was negatively correlated with age (but not with the age group dichotomy). As age increases, the score on the *Perception of Risk* component decreases. The older generation perceived more individual risk in terms of having other options available, being confident finding options outside of fishing and being too old to find work elsewhere. Studies in fishing populations support this finding, as Crosson (2014) examined fishery exit decisions by analyzing the relationships between socio-demographic variables and fishermen's expectations to continue fishing over the next ten years. Age was shown to have a significantly negative influence on future fishing expectations. According to Crosson (2014), it is difficult to imagine a model where older fishermen are unlikely to foresee their own retirement and their

ability to engage in heavy physical work into the future. Other literature on aging and adaptability also suggests factors similar to the *Perceptions of Risk* component, where the older generation was found to experience greater limitations and perceive more aging related uncontrollability (Cheng et al. 2014). Although the older generation of fishermen perceived to have limited resilience in terms of *Perceptions of Risk* there was no difference between generations in the *Ability to Cope* and *Adapt to Change*. According to the literature reviewed of Zacher (2014), an individual's ability to align themselves with the environment decreases with age, however older individuals compensate with this by enhancing the desire to do so which in turn increases self-esteem, control, and confidence over time. This is one finding that could explain the more positive perceptions on the ability to cope and adapt to changes as older fishermen perceive uncontrollable factors (aging) as putting them at higher risk in their ability to adapt, but have confidence they can still remain adaptable.

The mean age in the present study was 46.7 years. O'Connell et al (2008) argue that those born in the Gen X generation, between 1965 and 1981, differ from those born in previous generations such as the Silent Generation or Baby Boomers. For those born in the Gen X generation, the age of the individual would roughly be between 35 and 51. This age group encompasses almost 50% of the sample in the present study. It is suggested that they entered the work force during a time when they expected to make several considerable changes in their employment or career direction. This could be one explanation for the high levels of resilience.

5.1.4 Hypothesis II

The second hypothesis in this study states that fishermen's perception of resilience is different between fishery gear type. Analysis of this variable was used by measuring the three main gear types –net, trap, and dredge. The resilience variable *Ability to Cope* was shown to have differences between dredge and net gear, where those who fished with dredge gear felt they could cope with changes more than net fishermen.

In addition to these findings, 91% of dredge fishermen mentioned their income has increased since they began fishing. This finding suggests that income may be a contributing factor to the findings that dredge fishermen perceive they are more able to adapt. Looking at data between 1997- 2006, there was a significant increase in value for scallops. Groundfish in the same time period saw a decrease in value (NOAA 2014). Therefore, the differences between net and dredge gear fisheries are expected with almost half of net fishermen stating their income has decreased since they began fishing.

5.1.5 Hypothesis III

The third hypothesis developed states that differences between ports may influence the relationships between variables included in the first two hypotheses. As discussed above, significant differences were found between both ports. These relationship differences such as income levels, principal species, gear type, etc., may influence relationships between the resilience variables and age.

For Point Judith alone, through correlation analysis, an increase in age in years showed an increase in *Adaptation to change*. Additionally, those who perceived higher levels of *Adaptation to change* were more likely to *advise a young person* to enter the fishing occupation and would *fish if they had their life to live over*.

The average years involved in fishing for Point Judith was 27. Therefore, the majority of the sample has been through some of the most significant management changes in fisheries for almost three decades. As the concept of resilience in social-ecological systems (SES) states there are multiple phases of a system (Walker et al. 2004), in this case policies in the management of fishing resources. The conservation phase (K) results in resources being locked up and the system being less flexible and receptive to external shocks. In a very simplistic form of the cycle, the (K) phase gives way to the reorganization phase (α) during which innovation and new opportunities are possible. As Rogers (2003) states, when a number of individuals in a social system adopt a new idea, only a few individuals adopt the innovations at first and then the number begins to climb as more individuals adopt the idea. The rate of adoption begins to level off, as fewer individuals remain who have not yet adopted the idea. Given that the average fishermen in Point Judith has lived through multiple decades of management change and are still active in fishing, could explain the positive link between age and *Ability to Adapt*. Fishermen in Point Judith have had to find a way to make a living despite management restrictions for decades and those still fishing have made it work. Therefore, they could perceive to have more confidence in their ability to continue adapting into the future. A significant management change to impact fishermen in New England is the introduction of sector management in 2010,

where many ports saw a decrease in active vessels and fleet consolidation directly after implementation (Brinson and Thunberg 2013). Point Judith has a more diverse list of species landed in the port and fewer vessels fish species in the groundfish management species complex under sector management than New Bedford. In the present study, nearly 90% of vessels in Point Judith fish at least two or more species; with up to 11 species were mentioned. Therefore it could be argued that there were fewer negative influences to fishermen with the implementation of catch share management to the Multispecies (groundfish) industry in Point Judith because of their diversity and alternatively a possible explanation for the fishermen's positive perceived adaptation.

In New Bedford, there were no correlations between age and the resilience variables. An increase in crew size however, shows a higher level of fishermen's *Ability to Adapt*. This is expected with the larger, more corporate shore owner vessels in New Bedford that generate more income. There was a negative correlation between the numbers of species targeted and *Perception of Risk* and *Ability to Cope*. This was also expected as New Bedford has a low number of species targeted with the majority (51%) being a single species, scallops. Based on the sample, dredge fishermen perceived themselves to have higher levels of resilience even if they fish for primarily one species. If the market or scallop population were to decrease for any number of reasons the results in this study suggest they could have devastating influences to fishermen's perceived resilience in New Bedford as they aren't as diverse in the number of species they are fishing. Many studies have shown the importance of 'within-fishing diversification' (portfolio theory) in creating a buffering mechanism in

the face of change (Schindler et al. 2010, Minnegal and Dwyer 2008). Kasperski and Holland (2013) investigated income diversification and risk among U.S. West Coast and Alaskan fishermen and concluded that vessels that are able to diversify across multiple resources can reduce income variation and associated financial risk. Policy strategies in the U.S., however, are not aimed at maintaining fisheries diversity (Whitmarsh 1998, Sethi 2010).

An interesting result for income by age group was the younger generation's differences between both ports. In Point Judith, the younger generation's annual income peaked at \$40-\$59,000 and New Bedford at \$100,000- \$199,999. The differences between age groups and positions were also statistically significant in that there are more younger fishermen that are crew than older. In New Bedford, 60% of the total sample were crew members.

Despite the many differences in ports, particularly the higher income levels in New Bedford, both ports saw a positive correlation between income levels and the *Ability to Cope*. With income proven to be an important factor in resilience in both ports, the explanation for no significant differences in age and adaptability in New Bedford can be related to the fact that younger fishermen there are making significantly higher incomes than the younger generation in Point Judith.

5.1.6 Job Satisfaction findings

There were notable differences in job satisfaction by age group, as the older generation of fishermen scored higher for *Self-Actualization* and *Social and Psychological Needs* components, stating that they were more satisfied with the

variables in these two components which include: adventure, challenge, opportunity to be their own boss, and time spent away from home, physical fatigue, and healthfulness of the job.

Job satisfaction components across fishery gear types showed differences in the *Basic Needs* component. Those that fish with dredge gear (scallops and clams/ocean quahog), have a higher satisfaction with their monetary gains from fishing. The higher average satisfaction score with *Basic Needs* in New Bedford is likely to account for the higher levels of resilience scores overall as *Annual Income from Fishing* was significantly correlated with *Ability to Cope* for the total sample. There were no differences between ports with job satisfaction.

5.1.6.1 Correlation of job satisfaction variables

For the total sample, the variable *Basic Needs* was statistically significant correlated with the *Ability to Cope* component. *Perceptions of Risk* was positively correlated with *Social and Psychological Needs* and *Basic Needs* in New Bedford. Both showed that higher levels of satisfaction with both those variables, showed an increase in their *Perception of Risk*. New Bedford's longer average trips (time spent away from home) in days could explain the difference between the two ports in *Perception of Risk*. More demanding and longer trips essentially could have more negative influences with health and physical fatigue. Those that are more satisfied with their overall health are more likely to have more positive perceptions of their ability to find work elsewhere if they needed to or to be less nervous trying something besides fishing.

For Point Judith, the same variables, *Social and Psychological Needs* and *Basic Needs* were positively correlated with *Adaptation to Change*. The majority of fishermen fished net and trap gear, where the overall influence with regulations has been more negative than dredge gear fisheries in New Bedford. Fisherman show the more satisfied they are with the healthfulness of the job and time away from home, as well as the financial status of their fishing activity, the more positive they feel about their ability to adapt to change. Fishermen in Point Judith, who have had to find innovative ways to make things work for them in the past few decades and feel confident doing so in the future are likely to be more satisfied with these two variables.

5.1.6.2 Attachment to fishing

Two questions focused on measuring fishermen's attachment to the industry. The first, "Would you still fish if you had your life to live over?" showed majority of fishermen (70%) would fish if they had their life to live over. This finding, combined with the similar levels of job satisfaction shown between both ports strengthens the argument discussed in the literature that fishermen have high levels of attachment to fishing (Pollnac and Poggie 2008, Gatewood and McCay 1990).

Another attachment to industry question asked was if fishermen would leave fishing for a job that promised greater income than fishing. For the overall sample, 45% stated they would leave fishing, 22% would not, and 33% said maybe. There were more negative responses (would not leave fishing) in New Bedford than Point Judith. For those that said they would leave, they were then asked if they would leave fishing for a job with the same income. Only 24% of the sample reported they would

leave fishing if offered a job outside of fishing with the same income. Many fishermen stated the reasons they would not leave was because they “liked it [fishing]” or “liked being their own boss,” coinciding with *Self-Actualization* variable of job satisfaction. Given that the majority of fishermen said ‘no’ or ‘maybe/depends’ (55%) to leaving fishing, it is likely that fishermen would be reluctant to leave the occupation of fishing despite adversity (Crawford 2002). The same was true for the question “Do you see yourself fishing in the short, medium, long term.” This question was asked to understand fishermen’s perceived ability to sustain their business into the future. The majority (61%) stated “long term” and “All I know/My Life” and “Like it/enjoy it” were the top responses when asked why.

It is possible that fishermen who have been in the industry through the past few decades of management change see the challenge of being resilient and adaptive as a part of the business today. The fishing industry has seen a decrease in the number of vessels throughout the country including these two Southern New England ports. Therefore, for those who have survived the changes and maintained their livelihood this long, by nature they have a desire to be innovative and maintain adaptability. Many fishermen stated that fishermen are adaptable and they “*find a way to make it work*.” One question to think about further is if survival, as in job security and maintaining livelihood, is the ‘new’ challenge and adventure of the job in today’s fisheries.

5.1.7 Other potentially important findings

According to Rogers (2003), a generalization about earlier adopters of a new idea or practice is that they have greater exposure to communication channels and

mass media. The vast majority of the sample in the present study keeps up to date with fishery issues (78%). The most popular way in which fishermen keep up to date was magazines (67%). The theory that the more communication and involvement in issues, the more likely you are to adopt a new idea or practice, could be another explanation as to the high levels of resilience in the study sample.

Examining age of fishermen in fisheries brought up some unanticipated findings other than the level of resilience. One concern that was discussed by fishermen was the lack of young people entering into the fishery today. The distribution of the younger and older generation based on the mean age of the entire sample, showed a higher sample size in the older generation versus the younger (59 and 41% respectively). This idea of an aging trend in fisheries, known in the literature as the “graying of the fleet” was brought up mostly by the younger generation of fishermen. The aging of current industry participants in studies on natural resource- dependent communities is found throughout the literature (Hamilton and Otterstad 1998, Yagi 2006, West and Hovelsrud 2010, Donkersloot 2006, Russel et al. 2014, Donkersloot and Carothers 2016). Evidence of an aging fisheries workforce and low rates of recruitment of young people has increased concern about the ability for fisheries to be sustainable and attract the next generation (PFMC 2013, Russell et al. 2014). Fishermen that discussed the issue found that consolidation of the fleet and corporations made up of multiple vessels that are developing in fisheries is limiting access for the younger generation. Operations are becoming too expensive to start up because of the cost of permits. As one fisherman states:

“There has been a slow depreciation, boats are getting older. It could rebound with time, but there is no recruitment, no new talent, no new deckhands. The

career deckhand doesn't exist anymore, guys can't count on making \$80,000 a year anymore." – crew, 42 years old, net gear, personal communication, Point Judith

Fishermen stated that regulations have limited the number of crew on a vessel per trip, therefore less opportunities for people to enter the industry as a crew member, which has historically been a point of entry and enabled many fishermen to work their way up.

"There were a lot of lost jobs...was 14 guys on a boat now only 4. The little guys are gone... 30 boats are owned by one person. There are four people that own fisheries, all big corporations. Nobody can afford insurance, etc." – captain, 51, dredge, personal communication, New Bedford.

Russell et al. 2014 also found a weakening of family succession into the fishery. This issue was found in the present study as one fisherman states:

"I'm home more often. I'm a fourth generation fishermen and I'm happy they [kids] won't get into fishing with the rules and regulations" –captain, 47 years old, net gear, personal communication, New Bedford

According to Rosvold (2006) the higher entry costs due to limited entry approaches to fishery management can also advance the aging of the fleet trend. The ongoing decline in the number of small-scale fishing operations (Andreatta and Parlier 2010) has created shifts in the attractiveness of fishery-related jobs (Pascoe et al. 2015).

Another interesting finding was when asked what they perceive to be the biggest change impacting fishermen today, responses showed a few differences between age groups. New technology and modernization was unique to the older generation and those that stated 'environmental/species changes/climate change' were mostly those in the older generation. Sample sizes were small for these findings,

however further research could investigate generational differences in perceptions of changes.

Findings described in the present study allow understanding of Southern New England fishermen's perception of their ability to cope and adapt to management changes. Results suggest that income and monetary gains play a very important role in fishermen's perception of their ability to adapt and cope with changes. Correlations between levels of job satisfaction, particularly the basic needs suggests that a decrease in income could result in lower levels of perceived ability to adapt to changes and a decrease in resilience.

Research done by Seara et al. (2016) offered a through time comparison of job satisfaction for 1977, 2009/10, and 2012/13 in the ports of New Bedford and Point Judith and results showed a decrease in *Basic Needs* and *Social and Psychological Needs* throughout the years. As some of the levels of subjective resilience used in this study were positively correlated with these job satisfaction variables, there could also be a decrease in subjective resilience for both ports over time. As Marshall and Marshall et al. (2007) suggest, influences on well-being and overall perception of the ability to adapt can be associated with fishermen's willingness to comply and cooperate in the management process. Therefore it is in the interest of policy-makers to maximize resilience among fishermen.

The results of the present study and future studies alike can be helpful in making policy decisions in fisheries. By looking at the difference in adaptability by age and gear type, managers can understand how the individuals involved will be influenced by continuously changing management policies. For those in the older

generation, considerations on their ability to secure work elsewhere and remain competitive in the workforce are important to reduce the level of risk fishermen have on new policies. Creating programs through policies that allow job re-training or skills needed to remain resilient in fishing could provide assistance. For those ports where fishermen perceive they are more confident in the ability to adapt, understanding what factors contribute to their higher levels of resilience can also be beneficial to policy makers when enacting future regulations. Fishermen and policy makers can learn from others who have been innovative, resilient, and have sustained successful businesses. Those in New Bedford showed higher levels of perceived resiliency, however, policy makers should understand potential influences to vulnerability into the future as scallop fishermen and business owners in New Bedford could have critical impacts to their livelihoods if the state of that fishery should change. Diversification within the literature, along with findings in the present study, have shown to be an important influence in levels of perceived resilience and vulnerability. Incorporating management practices that encourage fishermen to maintain diversity could increase sustainable businesses, open up more opportunities for the next generation of young fishermen, and maintain livelihoods that have been important to these ports for generations.

5.2 Conclusions

This study was designed with the main objective of responding to the following research question: Have management practices affected the resilience of New England fishermen by limiting their perceived ability to adapt to changes in both young and older fishers? In order to answer this research question, 92 fishermen in

Point Judith, Rhode Island and New Bedford, Massachusetts were approached in their ports and agreed to participate in face-to-face surveys. Data from these surveys was dichotomized into an older and younger generation based on the mean age. To measure participants' level of perceived resilience, the Marshall and Marshall (2007) indicator for subjective individual resilience was used to study their perceived risk, ability to cope and ability to adapt to changes in management.

Results show that fishermen perceived themselves to have the same level of resilience in both age groups. There was not strong enough evidence to say that one generation is more adaptable than the other. However, results of correlation analysis, which examines this relationship on a finer scale than the simple dichotomy, showed the *Perception of Risk* component was negatively correlated with age. The older in age, the greater the perceptions of perceived risk, which includes options available outside of fishing, confidence in getting work outside of fishing, and nervousness trying something outside of fishing. This finding holds true with the aging literature where there are circumstances, such as aging, that may limit adaptation. However, there were no correlations between age and perceived ability to cope and adapt to change. This contrasts with the literature that suggests the older generation has more desire to align themselves with the environment so confidence is increased over time, which explains their perceived ability to adapt and cope with changes. Given fishermen in the present study have been involved in fishing for an average of 27 years, participants have adjusted their fishing businesses throughout the past few decades. They have had to continuously adapt and change to the new policies. The idea that they are still able to fish and make a living, although some of the participants

have seen a decrease in income, the fact they are still fishing today may increase their perception and confidence of adaptation even as they get older. Therefore, results of the present analyses to test the hypothesis that younger fishermen are more adaptable than older fishermen are inconclusive.

The most obvious differences in perceptions of fishermen's ability to cope was shown between fishing gear groups. Those that fish using dredge gear have higher average subjective resilience scores than those that fish net gear. Almost all of dredge fishermen (91%) stated they have experienced an increase in income since they began fishing. They also had the highest level of income with average of \$125,000-\$149,000. Almost all dredge fishermen were in New Bedford. As such, there were significant differences between both ports which may have limited the ability to capture true individual subjective resilience in fishermen by use of the resilience scale.

The Marshall and Marshall (2007) scale may have been too general or too simplified for fishermen to truly express their perceived level of resilience. This study did not capture in depth the rationale behind fishermen's perceptions of change in management, but the results obtained do suggest opportunities for further investigation regarding New England's fishermen's perceptions of change. A more in depth study of fishermen's perceptions of management changes could provide more significant results.

Another limitation to this study was the sampling of fishermen within different fishing sectors. As found in the analysis, New Bedford's scallop industry has a much higher level of resilience given the lucrative nature of the fishery. Those that fished trap gear had lower sample sizes so it was difficult to reach any conclusions on

perceived differences in resilience in that sector. It would be interesting to expand the sample size in one or all fisheries to see if that would uncover resilience differences between age groups. Another interesting perspective in the aging and adaptability literature was multiple generations reacting differently to changes. By expanding the sample size, it may also be possible to examine more age categories such as younger, or new entrants, middle-aged, and an older generation. Doing so would expand knowledge concerning details on the “graying of the fleet” by understanding how new entrants are adjusting to difficulties in entrance and what they see for the future of fishing versus a middle aged and older perspective. It would be beneficial to policy makers to capture perceptions of new entrants as research has shown that the difficulty in attracting a new generation of fishermen could have significantly negative influences on the industry into the future.

The results of this study serve to further illustrate the complexity of measuring subjective resilience in fisheries, but it can be used to initiate further research based on the findings. As shown in the present study, fishery sectors have very different characteristics that can impact their ability to adapt to changes in the industry. Showing these differences allows understanding on how management measures may impact individuals in various ways and how to ensure that negative influences are minimized within fishing communities. There are few studies that examine subjective resilience by age groups, but the importance of the issue should be considered in the future as people are aging out of the industry with low levels of recruitment. It is critical for the future of fisheries in New England to not only have a younger generation entering, but one that is able to cope and adapt to future policy changes.

APPENDIX I

Questionnaire

SURVEY# _____

LOCATION: _____

START TIME: _____

DATE: _____

A. Demographics/Catch composition

1. Where do you live? (town, state) _____ 1.a How long have you been living there? _____

2. What is your current position on the boat? (If more than one, ask the most frequent).

Captain	
Owner	
Captain/owner	
Crew	
Mate	

Crew size: _____

Comments: _____

3. Do you own a fishing boat? Yes ___ No ___

3.a If **YES**, how many? _____ 3.b What type(s)? _____

3.c. Have you been actively fishing with your boat? Yes ___ No ___

3.d If **NO**, have you ever owned a fishing boat? Yes ___ No ___

3.e If **YES**, what type? _____ 3.f Why not anymore? _____

4. Do you hold a fishing license? Yes ___ No ___

4.a If **YES**: RI multi-purpose? Yes ___ No ___

4.b If **YES**, Principal Effort? _____

4.c Endorsements? Yes ___ No ___

4.d If **YES**, what kind(s)? _____

4.e Other: _____

4.f If **NO**, have you ever owned a fishing license? Yes ___ No ___

4.g If **YES** what type? _____ 4.h Why not anymore? _____

4.i Does the boat you fish on have a federal license? Yes ___ No ___ 4.j Type: _____

5. Does the boat you fish on belong to a sector? Yes ___ No ___

6. What gear(s) do you use specifically? _____

6.a Do you use more than one type of gear on one same boat? Yes ___ No ___

- 6.b If **YES**, describe: _____
7. What is the average trip length? _____ 8. How many years of fishing experience do you have? _____
9. How long have you been fishing out of Point Judith? _____ 9.a How long on current boat? _____
10. [*Types of fish/shellfish harvested throughout the year*] What do you fish for now/past year? _____

- 10.a Which of these represents the greatest volume (not price)? _____
- 10.b Which is second? _____
11. [*Thinking back when you first began fishing in RI*] What species did you fish for? _____
12. How old are you? _____ 13. How many years of formal education have you had? _____
14. How many boats have you fished on since you began fishing? _____
15. Do you have any relatives currently in the fishery? Yes ___ No ___ Number ___
- 15.a Any relatives fishing on the same boat as you? Yes ___ No ___ Number ___
- 15.b How many generations of your family have fished including you? _____
16. What is your marital status? _____ 16.a Does your partner have an occupation? Yes ___ No ___
- 16.b If yes, what occupation? _____
17. Do you have any children living with you? Yes ___ No ___ Number ___
18. Do you have any dependents outside the household? Yes ___ No ___ Number ___
19. Do you currently have any occupations besides fishing? Yes ___ No ___
- 19.a If yes, which one(s)? _____
20. Based on the different categories below, what would your total income be?
- 20.a Based on the same categories what would your partner's income be?

Income categories	Respondent	Partner
Under 10,000		
10,000 – 14,999		
15,000 – 19,999		
20,000 – 24,999		
25,000 – 29,999		
30,000 – 34,999		
35,000 – 39,999		

40,000 – 44,999		
45,000 – 49,999		
50,000 – 59,999		
60,000 – 74,999		
75,000 – 99,999		
100,000 – 124,999		
125,000 – 149,999		
150,000 – 199,999		
Over 200,000		

21. List all occupations you have had outside the fisheries in the past, if any:

B. Resilience

Based on Marshall & Marshall (2007)

Level of agreement with the statements below:

1. I have many options available if I decide to no longer be a fisher.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

2. I am confident that I could get work elsewhere if I needed to.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

3. I am too young to retire and too old to find work elsewhere.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

4. I would be nervous trying something else.

5 strongly disagree 4 disagree 3 neutral 2 agree 1 strongly agree

5. I can cope with small changes in industry.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

6. I have planned for my financial security.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

7. Every time there is a change I plan a way to make it work for me.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

8. I am more likely to adapt to change compared to other fishers.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

9. I do not think I am competitive enough to survive much longer.

5 strongly disagree 4 disagree 3 neutral 2 agree 1 strongly agree

10. I am confident things will turn out well for me.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

11. If there are any more changes I will not survive much longer.

5 strongly disagree 4 disagree 3 neutral 2 agree 1 strongly agree

12. I am interested in learning new skills outside the industry.

1 strongly disagree 2 disagree 3 neutral 4 agree 5 strongly agree

C. Job Satisfaction

Based on Pollnac & Poggie (2006)

How satisfied are you with the following items related to the job of fishing?

1. Your actual earnings?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

2. Predictability of your earnings?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

3. Job safety?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

4. Time spent away from home?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

5. Physical fatigue of the job?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

6. Healthfulness of the job?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

7. Adventure of the job?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

8. Challenge of the job?

1 Very dissatisfied 2 Dissatisfied 3 Neutral 4 Satisfied 5 Very satisfied

9. Opportunity to be your own boss?

1Very dissatisfied 2Dissatisfied 3Neutral 4Satisfied 5Very satisfied

10. Would you advise a young person to enter fishing? No___ Yes___

11. Would you still fish if you had your life to live over? No___ Yes___

END TIME:_____

Additional Questions:

1. Do you see yourself still fishing in the: (circle)

Short term

Medium term

long term

1a. Why?

2. If you were offered a job that promised you an income greater than you are making from fishing, would you leave fishing for that job?

2a. if YES: If you were offered a job that promised you the same income that you are making from fishing now, would you leave fishing for that job? Why?

3. How does your income from fishing now compare to what it was when you began fishing?

Significantly lower / lower / same / higher / significantly higher

4. Do you keep up to date on fishery issues/ changes in the fishery by any of the following? (circle all that apply)

Newspapers

magazines

Internet

Meetings

Word of Mouth

Other _____

5. What has been the biggest change(s) in the fishing industry?

6. Which regulations have impacted your income the most? (circle)

Gear restrictions

quota system

size/sex regulations

Days at sea

catch shares

area/fishery closures

Others? _____

7. Have regulations had an impact on your family? How?

APPENDIX II

POINT JUDITH, RI:

Residence	Frequency (N)	Percent (%)
Westerly, RI	1	1.961
Portsmouth, RI	1	1.961
West Kingstown, RI	2	3.922
Charlestown, RI	8	15.686
Wakefield, RI	11	21.569
South Kingstown, RI	9	17.647
Narragansett, RI	8	15.686
Putnam, CT	1	1.961
Exeter, RI	4	7.843
Hopkinton, RI	1	1.961
North Kingstown, RI	1	1.961
East Greenwich, RI	1	1.961
Peace Dale, RI	1	1.961
Westerly, RI	1	1.961
Richmond, RI	1	1.961
Total	51	100.0

NEW BEDFORD, MA:

Residence	Frequency (N)	Percent (%)
Dartmouth, MA	1	2.439
New Bedford, MA	14	34.146
South Thomaston, ME	1	2.439
Wareham, MA	1	2.439
Mattapoisett, MA	2	4.878
Forked River, NJ	1	2.439
Fall River, MA	2	4.878
North Dartmouth, MA	1	2.439
Edgartown, MA	1	2.439
Richmond, VA	1	2.439
Fairhaven, MA	3	7.317
Acushnet, MA	5	12.195
Portland, ME	1	2.439
South Carver, MA	1	2.439
Cape May, NJ	2	4.878
Total	41	100.0

APPENDIX III

Occupations besides fishing mentioned by respondents:

Occupation	Frequency
Engineering	1
Boat Building/Repair	1
Carpentry	1
Construction	1
Farming	1
House Painting	1
Tree farming	1
Journalist	1
Mechanics/Fiberglass	2
Contractor Cable Company	2
Truck Driving	1
Paramedic	1

APPENDIX IV

All species fished:

Species	N
multispp-squid, scup, butterfish	37
groundfish	32
scallops	28
lobster/crabs	23
monkfish	13
whiting	11
sea bass	8
skates	8
clams/quahogs	6
conch	3
squid	3
bluefish	2
fluke	2
striped bass	2
blackfish	1
herring	1
mahi/mahi	1
mackerel	1
Porgie	1
tautog	1

APPENDIX V

Gear:

Primary Gear type by age group

Gear	</=45	>45
Nets	24	29
Traps	9	7
Dredge	5	18
Total	38	54

Other Gear Used:

Gear	Point Judith	New Bedford	Total
Nets	2	4	6
Lobster traps	1	1	2
Dredge	3	7	10
Gillnet	2	-	2
Fish Pots	2	-	2
Rod & Reel	3	-	3
Mid-Water Trawl	1	-	1
Traps + Rod & Reel	1	-	1
Nets (Trawl)	1	-	1

APPENDIX VI

Would leave fishing if offered higher paying job:

Would leave fishing if they were offered a job higher than fishing by age group

	≤ 45	>45	Total
Yes	17(60.7%)	14 (34.1%)	31 (44.9%)
No	4 (14.3%)	11 (26.8%)	15 (21.7%)
Maybe/Depends	7 (25%)	16 (39.0%)	23 (33.3%)
	28	41	69 (100.0%)
$(\chi^2 = 4.800, df=2, p>0.05)$			

Distribution of those that would leave fishing if they were offered a job with higher income by gear type:

	Net	Trap	Dredge	Total
Yes	19 (51.4%)	2 (22.2%)	10 (43.5%)	31 (44.9%)
No	6 (16.2%)	2 (22.2%)	7 (30.4%)	15 (21.7%)
Maybe/Depends	12 (32.4%)	5 (55.6%)	6 (26.1%)	23 (33.3%)
	37	9	23	69 (100%)
$(\chi^2 = 4.408, df = 4.0, p>0.05)$				

APPENDIX VII

Do you see yourself fishing in the short, medium or long term by port:

	Point Judith	New Bedford	Total
Short term	16.7%	25.6%	21.7%
Medium term	23.3%	12.8%	17.4%
Long term	60.0%	61.5%	60.9%

Do you see yourself fishing in the short, medium or long term by gear type:

	Net	Trap	Dredge	Total
Short term	5.8%	5.8%	10.1%	21.7%
Medium term	10.1%	2.9%	4.3%	17.4%
Long term	37.7%	4.3%	18.8%	60.9%

Reasons why see yourself fishing in short term:

Reasons why	Total
Changes in Industry/ Regulations/Harder to make a living/financial	7
Age/retirement/ physical health/doing it too long	5
Family/ personal reasons	1

Reasons why see yourself fishing in medium term:

Reasons why	Total
Changes in Industry/ Regulations/Harder to make a living/financial	4
Age/retirement/ physical health/doing it too long	5
Family/ personal reasons	2
Other	1

Reasons why see yourself fishing in long term:

Reasons why	Total
All I know/ My life	11
Changes in Industry/ Regulations/Harder to make a living/financial	2
Like it/enjoy it	7
Age/retirement/ physical health/doing it too long	3
Provides good income/provide for family	8
Other	7
Nothing else	1

APPENDIX VIII

Biggest change in fishing industry by age group (N):

Biggest Change	</= 45	>45	Total
Regulations	22	34	56
Gas/Fuel/Economy/Market price	3	2	5
Less boats/ Harder to find jobs/less or no crew	3	1	4
Companies buying/marginalize	1	1	2
Environmental/Species Changes/Climate Change	1	4	5
New technology/Modernization	-	2	2
Other	1	2	3

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