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FISHERMEN'S PERCEPTIONS OF FISHERMAN-SCIENTIST RELATIONS IN MAINE

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ABSTRACT

Improving relations between fishermen and scientists is becoming increasingly important as fisheries scientists and managers work towards incorporating fishermen in research efforts and management decisions. The history of fishermen's resentment towards scientists and scientific institutions, particularly in New England, illustrates significant obstacles towards such efforts. Understanding the dynamics of fisherman-scientist relations, then, is imperative to furthering the success of participatory efforts. However, little research has been conducted to better understand the quality of fisherman-scientist relationships, and the factors that affect them.

The purpose of this study is to explore the quality of fisherman-scientist relations from the perspective of commercial fishermen in Maine, and investigate influencing factors. Eighteen lobstermen from three ports in Maine were interviewed during Fall 2013 to better understand fisherman-scientist relations. Respondents were asked about their personal characteristics, their experiences interacting with scientists, and their general perceptions of fisherman-scientist relations, relationship trends, and fishery conditions.

Interviews were transcribed and coded according to grounded theory. Two categories of comments relating to fisherman-scientist relations emerged: relationship context and relationship quality indicators. Six relationship quality indicators emerged: trust, receptivity, communication, influence, satisfaction and commitment. Four factors influencing trust also emerged: competence, integrity, credibility and accountability.

Results indicate that commercial fishermen in Maine tend to perceive fisherman-scientist relations in a negative manner. Fishermen's homeport, education attainment and

perception of resource health tend to have substantial effect on perceptions of the fisherman-scientist relationship. Results also suggest that relationship context is a potentially significant determinant of relationship quality. It was also found that trust was the relationship quality indicator most frequently mentioned, followed by receptivity, communication and influence. Of trust factors, competence was mentioned by all respondents, suggesting that fishermen's perceptions of scientists' competence is likely the most substantial factor affecting trust.

Findings provide scientists and managers in Maine and elsewhere valuable insight into improving relationships with fishermen, and subsequently improving participatory research efforts.

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CHAPTER 1: INTRODUCTION

The rocky relationship between fishermen and fisheries scientists in Maine has long been an issue (Dobbs, 2000; Feeney *et al.,* 2010; Johnson and van Denson, 2007; Johnson, 2010; Kaplan and McCay, 2004; Hartley and Robertson, 2006; St. Martin *et al.*, 2007). Fishermen across gear sectors are known for their resentment of agency-produced science and subsequent regulations. This attitude stems from multiple factors including, but not limited to, opposition to scientific methods and results, mistrust of scientist's interests and intentions, perceptions of scientist's arrogance (particularly when confronting fishermen knowledge), and poor communication between both groups (Hartley and Robertson, 2008).

The need for improvements in fisherman-scientist relations and cooperation in managing fisheries and conducting research has been emphasized both in recent fisheries management literature and in the Magnuson-Stevens Act (MSA, 2007; Feeney *et al.,* 2010; Johnson and van Denson, 2007; Johnson, 2010; Kaplan and McCay, 2004; Hartley and Robertson, 2006; St. Martin *et al.,* 2007). As such, the past decade has seen a significant increase in cooperative research (Feeney *et al.,* 2010; Johnson, 2010). However, the history of distrust and resentment between fishermen and scientists impedes the success of these efforts, evidenced by fishermen's reluctance to participate and scientist's reluctance to acknowledge the legitimacy of fishermen's knowledge (Hartley and Robertson, 2008).

The purpose of this study is to better understand the dynamics of fisherman-scientist relations in Maine by exploring fishermen's perceptions, and the factors and experiences that influence them. This research will aim to better understand how

fishermen perceive fisherman-scientist relations, and what factors contribute to their perceptions.

Chapter Two will present background information on participatory research, as well as studies investigating perceptions of relationship quality and trust in various fields of study. An overview of Maine fisheries will also be presented. Chapter Three will describe the methodology used in the thesis, and provide an overview of the study sample interviewed. Chapter Four will provide the results of interview analyses. Chapter Five will discuss key findings, implications, and suggestions for future research. Lastly, Chapter Six will present conclusions.

CHAPTER 2: BACKGROUND

2.1 Participatory research

In fisheries science, participatory research is defined as research that incorporates both scientists and fishermen (MSA, 2007). There are multiple levels of participatory research, which depend on the involvement of fishermen in research processes. The spectrum ranges from cooperative research, which involves low levels of fishermen participation, such as the use of catch data, to collaborative research, which involves high levels of fishermen participation, such as the inclusion of fishermen in developing research questions and methods (NRC, 2008). For the purpose of this thesis, the term participatory research includes all levels.

The 2007 reauthorization of the Magnuson-Stevens Act (MSA) calls for increased efforts towards participatory research (MSA, 2007). Regions such as New England have seen notable increases in participatory research efforts in the past decade. Examples of this can be seen in the development of organizations and agencies such as the Northeast Consortium and NOAA's Northeast Cooperative Research Program, which both allocate significant funding towards studies which incorporate fishermen to varying levels.

There are several potential benefits of participatory research (Johnson and van Denson, 2007). First, participatory research can result in optimal data by widening the scope of knowledge and resources (Johnson and van Denson, 2007). Second, the inclusion of fishermen in research processes is thought to increase the legitimacy of data and regulations, which can increase compliance with fisheries regulations (Johnson and van Denson, 2007). Last, empirical evidence shows that participatory research bridges the

gap between fishermen and scientists, vastly improving relations (Johnson and van Denson, 2007; Hartley and Robertson, 2006).

Studies focusing on the effects of participatory research on fisherman-scientist relations in New England, however, are minimal. The most notable research was conducted by Hartley and Robertson (2006b, 2008), who explore fishermen's and scientists' perceptions of the benefits and challenges of efforts by the Northeast Consortium. Findings show that the involvement of fishermen in such research has resulted in improved communication, trust, respect and understanding between fishermen and scientists. Conversely, challenges exist due to a general distrust of fishermen toward scientists as a result of poor communication between the two parties, distrust of scientist's motives and interests, lack of shared values, and perceived negative attitudes of scientists towards fishermen (Hartley and Robertson, 2008).

The effects of participatory efforts on fisherman-scientist relations are complex. On one hand, tumultuous relations between fishermen and scientists threaten to hinder the process and benefits of participatory research. On the other hand, efforts towards participatory research have proven to bridge the divide between groups by enhancing communication, respect, trust and understanding (Hartley and Robertson, 2008; Feeney *et al.*, 2011). It can be concluded, then, that while the predominant assertion of current literature is that participatory research bridges gaps between scientists and fishermen, the success of these research programs are limited by the unstable nature of the relationships between these two stakeholder groups. Little research has been conducted to better understand how different factors influence relationships between fishermen and

scientists. As such, the solution (participatory research) to a problem has been offered before the problem is fully understood.

Current gaps in participatory research literature highlight the need for further research on two particular topics. First, further empirical evidence is needed to better understand the effects of participatory research on fisherman-scientist relations in New England. Such research must focus on identifying the effects of these programs, and what fishermen think about them. Second, research much be conducted on the fisherman-scientist relation itself, looking into how it is perceived by fishermen and what factors influence fishermen's perceptions and attitudes. This thesis aims to explore the latter.

2.2 Relationships

2.2.1 Measuring Perceptions of Relationships

Though it is widely known that relations between scientists and fishermen in the northeast US are less than optimal, there are few studies that have attempted to assess the quality of the relationship by measuring perceptions. There is, however, extensive literature in the public relations field devoted to assessing organization-public relationships (OPR), which may provide a potential framework for assessing fisherman-scientist relations.

Ledingham and Bruning (1998) define OPR as "the state that exists between an organization and its key publics in which the actions of either entity impact the economic, social, political and/or cultural well-being of the other entity". Determining methods to measure the quality of these relationships has been the key focus of many public relations studies for the past few decades. In particular, studies aimed to define the characteristics

that best represent the quality of the relationship. These characteristics, known as relationship dimensions, are used to construct surveys administered to actors within the relationship in order to measure relationship quality. Researchers have developed various models to measure relationship quality along a large variety of dimensions.

Table 1: Relationship dimensions used to measure the quality of organization-public relationships (Adapted from Jo, 2003).

Relationship Quality Dimension	**Definition**	**Referencing Studies**
Trust	The level of one's confidence in and acceptance of their own vulnerability to another. Can be assessed as one's opinions of another's levels of integrity, dependability and competence.	J. Grunig & Ehling, 1992 Huang, 1997 Ledingham & Bruning, 1998 Hon & J. Grunig, 1999 J. Grunig & Huang, 2000 Huang, 2001 Kim, 2001 Jo, 2003
Satisfaction	The degree of positive feelings between parties due to the reinforcement of positive expectations.	Ferguson, 1984 Grunig & Ehling, 1992 Huang, 1997 Hon & J. Grunig, 1999 J. Grunig & Huang, 2000 Huang, 2001 Jo, 2003
Commitment	The level at which one believes the relationship to be worthwhile.	Ledingham & Bruning, 1998 Hon & J. Grunig, 1999 J. Grunig & Huang, 2000 Huang, 2001 Kim, 2001 Jo, 2003
Control Mutuality	The degree to which both parties agree on the balance of power in the relationship.	Ferguson, 1984 Huang, 1997 Hon & J. Grunig, 1999 J. Grunig & Huang, 2000 Huang, 2001 Jo, 2003
Openness	The level of consistent and transparent communication between parties.	Ferguson, 1984 J. Grunig & Ehling, 1992 Ledingham & Bruning, 1998 Jo, 2003

Of the many relationship dimensions studies propose as significant indicators of relationship quality, trust, satisfaction, commitment, control mutuality, and openness emerged most often, and are considered the standard measures (Table 1).

These dimensions are widely used in public relations studies to measure relationship quality. However, it is not clear whether these dimensions would be appropriate or relevant in assessing fisherman-scientist relations. It would be useful, then, to further explore the OPR relationship dimensions in the context of fisherman-scientist relations, and in doing so begin to develop a framework specific to such relations.

2.2.2 Trust and influencing factors

While there is little literature assessing commercial fisherman-scientist relations by measuring perceptions, there is an extensive literature on trust between natural resource stakeholders and institutions. In particular, studies focus on trust between resource users and resource scientists and managers (e.g. Leahy & Anderson, 2007; Jacobsen *et al.,* 2001; Gray *et al.,* 2012; Glenn *et al.,* 2012; Davenport *et al.,* 2007).

The development of trust between stakeholders and institutions (e.g., government agencies, natural resource organizations) in the natural resource realm is dependent on a variety of factors (Table 2). Leahy & Anderson (2007) discuss public trust in management processes as hindered by lack of trust in the federal government, shared values and interests, procedural fairness, and technical competency (Table 2). Gray *et al.'s* (2012) research on trust between recreational fishermen and scientists demonstrates a high correlation between trust and both the health of the resource and levels of user participation in research and management processes. Likewise, Davenport *et al.'s* (2007)

research on community members' trust of natural resource management emphasizes that past experiences and levels of participation influence trust. In particular, Davenport *et al.* (2007) find that instances in which participants experienced low engagement and empowerment, unclear communication, conflicting values and slow progress in participatory processes and outcomes affected levels of trust, and subsequently relations.

Table 2: Potential factors influencing stakeholder trust of institutions in natural resource realms.

Factor Influencing Trust	**Description**	**Referencing Studies**
Communication/common language	The degree to which dialog is open and transparent, and commonly understood terms are used.	Davenport *et al*., 2007 Glenn *et al*., 2012
Competence	The degree to which scientific institutions are perceived as legitimate sources of knowledge.	Davenport *et al.*, 2007 Leahy & Anderson, 2008 Glenn *et al.*, 2012
Engagement/Participation	The level of past and present interaction between parties.	Davenport *et al*., 2007 Gray *et al.*, 2012
Shared values/vision	The degree to which both parties share interests and goals.	Davenport *et al.*, 2007 Leahy & Anderson, 2008 Glenn *et al.*, 2012
Resource health/capacity	The perceived level of resource health.	Davenport *et al.*, 2007 Gray *et al.*, 2012
Benevolence	The degree to which scientific institutions are perceived as acting in stakeholders' best interests.	Glenn *et al.*, 2012
Receptivity	The degree to which scientific institutions are perceived as open to fishermen knowledge.	Glenn *et al.*, 2012
Integrity	The degree to which scientific institutions are perceived as using information objectively and morally.	Glenn *et al.*, 2012
Predictability	The degree to which scientific institutions are perceived as consistent and reliable.	Glenn *et al.*, 2012
Credibility	The degree to which scientific institutions are perceived as independent and impartial.	Glenn *et al.*, 2012

Glenn *et al.* (2012) focused their research on trust within fisheries scientific communities, and posited nine components influencing trust levels. Lastly, both Gray *et al.* (2012) and Jacobson *et al.* (2011) discuss the role that scientist type has on stakeholder trust, finding that when highly associated with the federal government and regulations scientists are less trusted by stakeholders.

Notably, a considerable literature on trust and relationships exists outside the natural resource realm. While these studies are predominantly within the public relations field, and focus on trust between the public and organizations, they also provide an important overview of factors that influence trust. Most importantly, this research offers various categories of factors that influence trust (Table 3).

Table 3: Categorization of factors influencing inter-organizational trust

Author	**Categories of trust factors**
Lane & Bachmann, 1998	micro-level (relationship specific) and macro-level (external) factors
Whitener *et al.*, 1998	individual, relational, and organizational factors
Payne & Clark, 2003	dispositional, interpersonal and situational factors
Dietz & Den Hartog, 2006	trustor, trustee and relationship characteristics

There is considerable overlap among the categories of factors influencing trust from the natural resources literature and the public relations literature. In particular, themes related to the individual (e.g., fishermen demographics), the situation (e.g., the context of the relationship), and characteristics of relationships (e.g., levels of communication, etc.) are prevalent. This thesis research aims to explore how the factors identified in the literature relate to fishermen and scientists in Maine.

2.3 Maine

Fishermen and fishing organizations in Maine are involved in more participatory research projects than those in any other New England state (Figure 1). As the Department of Marine Resources (2010) asserts in research priority documents:

> "Maine fishermen have become full partners in establishing the research questions and pursuing the answers to those questions through collaborative research. Maine has been a leader in the region for engaging fishermen, scientists, and managers in the quest for better information on which to manage its fisheries." (p.2)

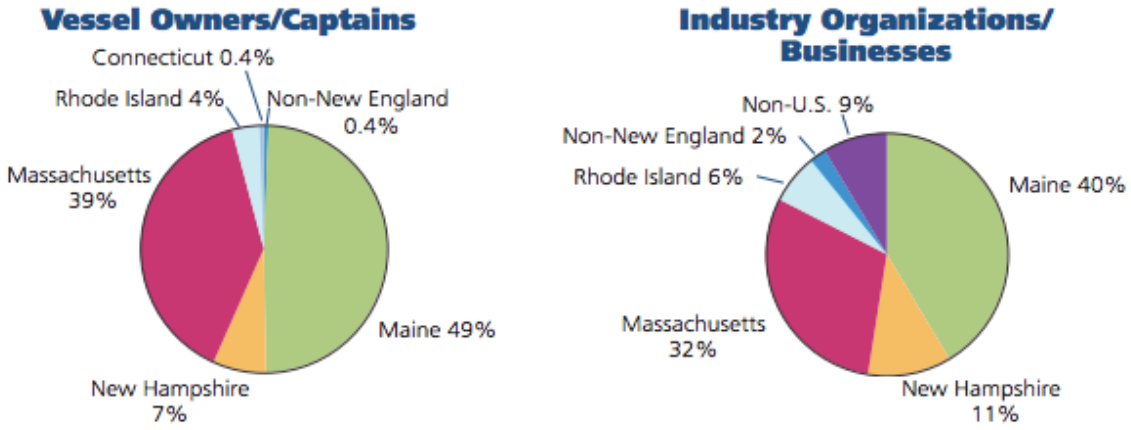

Figure 1: Commercial fishing industry participants in Northeast Consortium projects, by state (Northeast Consortium, 2010).

However, despite high industry involvement in participatory research in Maine, there is still tension between fishermen and scientists. In particular, Maine fishermen remain highly resentful of scientists (Cresta, 2012). This situation highlights the need to better understand fisherman-scientist relations in the state, and provides a useful context in which to conduct this research.

The lobster fishery dominates the fishing industry in Maine, accounting for over two thirds of annual landings (DMR, 2013). As such, this study focuses on Maine commercial lobster fishermen. The past few decades have seen record highs for lobster

landings, with catch increasing 239.9% since 1995 (Table 4). However, recent years have seen the supply of lobster far surpass the demand, and as such ex-vessel prices have decreased dramatically (Table 4).

Table 4. Status of the Maine lobster fishery (Source: DMR, 2014)

2013 landings (pounds)	125,953,877
2013 landings (value)	$364,518,516
Landings since 1995	238.9% increase
# license holders (2010)*	5,379
Value (2012)	Record lows ~$4/lb

*Represents both active and inactive license holders

A recent socio-economic survey of the lobster industry within the Gulf of Maine conducted for the Gulf of Maine Research Institute by Maurice *et al.* (2006) offers substantial insight into Maine lobstermen demographics, fishing activities, and operation sizes (Table 5; Table 6).

Table 5. Demographics of Maine lobstermen (adapted from Maurice *et al.*, 2006)

	Education Attainment			Average Age
	High School	Some College	Bachelor's degree or Above	
Survey Sample (n=695)	46%	22%	15%	50

Table 6. Fishing activity and operative size of Maine lobstermen (adapted from Maurice *et al.*, 2006)

	Vessel Length	Average Crew Size	Average Landings	Average Traps	Avg Years Fishing	% pop with non-lobster commercial fishing Permits
Survey Sample (n=695)	31ft	2	24,000lbs	556	29	35%

CHAPTER 3: METHODS

3.1 Study Area

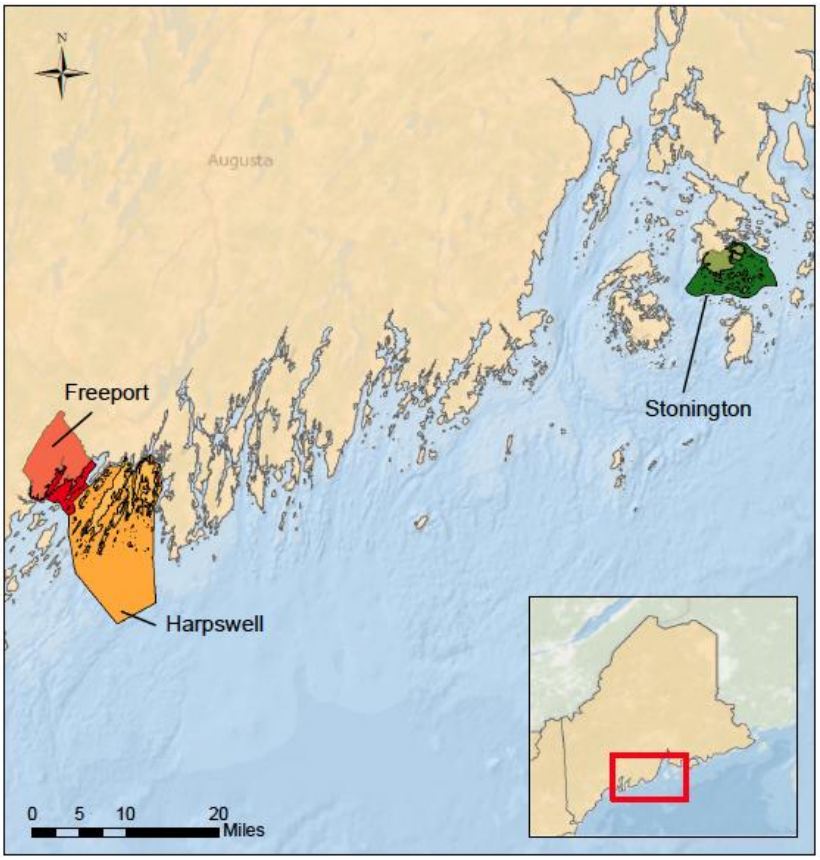

Figure 2. Study area locations along the coast of Maine.

This study was conducted in three different ports in Maine: Freeport, Harpswell and Stonington (Figure 2). To obtain data representative of different areas of the coast, the following criteria were used to select ports:

1. Location: Coastal Maine can be divided into three regions: Southern, Mid-coast and Downeast. Each port selected represents one of these regions; Freeport is Southern, Harpswell Mid-coast, and Stonington Downeast. Notably, Harpswell and Freeport are both located within Casco Bay. I

purposefully chose two ports close to one another to examine how physical proximity to one another affected results.

2. Size: For the purpose of this study, port size will be measured by number of vessels operating out of the port and the value of annual landings of the port (Table 7). Maine fishing ports range in size, from 60+ vessels to less than 10. Ports selected capture this range. Harpswell represents a medium-sized port, with approximately 55 vessels. Stonington is Maine's largest port, with approximately 68 vessels and 48.94 million dollars in annual landings. Lastly, Freeport is one of Maine's smallest ports, having approximately 12 vessels.
3. Demographics: Ports with varying demographics were chosen to ensure a variety of respondents. Demographic features considered when choosing ports include population, income ranges, education levels and occupational industries (Table 8).

Table 7. Size of each port where fishermen were interviewed.

Port	# Vessels Homeported*	Annual Landings ($)**	General Size
Freeport	12	n/a	Small
Harpswell	55	n/a	Medium
Stonington	68	48.94 million	Large

*# of vessels homeported was adapted from NOAA active permit holder data (NOAA, 2014)
**Annual landings by value were obtained from DMR data (DMR, 2014). However, only the top ten ports by value are reported. Stonington is the largest port in Maine, but neither Freeport nor Harpswell are within the top ten ports.

Table 8. Demographics of each town where fishermen were interviewed. Source: US Census Bureau, 2010.

Port	2010 Pop	Median Income Per Capita	% Pop in Agriculture, forestry, fishing and hunting industry		% Pop with Bachelor's degree or higher
			Male	Female	
Freeport	7,879	$27,185	1.4%	0%	40.3%
Harpswell	4,740	$38,324	14.3%	0.6%	42.2%
Stonington	1,043	$21,295	42%	1.9%	15.6%

3.2 Study Sample

A total of 18 fishermen were interviewed, six from each port. Permitted fishermen from each port were assigned numbers. The numbers were sorted using a random number generator and the first six fishermen from each port were invited to participate in the interviews. Of the fishermen contacted, only two of twenty did not participate, giving a response rate of 90%.

3.3 Data Collection

Interviews were conducted both in person and over the phone, and lasted between 20 minutes and 2 hours. Each interview consisted of three parts. Respondents were first asked a variety of demographic questions pertaining to their fishing activities, fishing operation size, age and level of education. Respondents were then asked a series of open-ended questions, which loosely followed an interview protocol (see Appendix A). This type of semi-structured interview was useful because it allowed for flexibility to follow leads, but also ensured there was some structure to the conversation (Bernard, 2002).

I began by asking fishermen to discuss interactions they have had with scientists, and prompted them to detail the circumstances of the interaction, how relations between themselves and the scientist(s) were during the interaction, and their level of satisfaction with their experiences. The sequence of questions was shaped by the comments and answers of the fishermen. Fishermen's responses were recorded in detail by hand during the interviews.

The interview concluded with a short structured survey using likert-scale questions (see Appendix A). There were three categories of survey statements:

relationship statements, trend statements and resource statements. There were seven relationship statements, to which respondents responded from strongly disagree (1) to strongly agree (5). There were four trend comments, to which respondents responded from much worse (1) to much better (5). There were three resource statements, to which respondents responded from very poor (1) to excellent (5).

3.4 Data Analysis

3.4.1 Quantitative

Structured surveys were analyzed by averaging responses for different demographic variables (port, level of education, age) to show possible trends in fishermen's perceptions.

3.4.2 Qualitative

Open-ended interviews were analyzed according to the grounded theory approach, through which the researcher identifies categories and themes that arise from interviews and begins to develop theories (Glaser and Strauss, 1967). Grounded theory was used as it is a useful approach when conducting exploratory studies, and aims to develop theories that will act as a basis for further research. I coded interviews line by line, following a framework that I developed in the initial stages of coding (Figure 3). I began by identifying what I call the "tone" of each comment. Tone indicates interviewees' general attitude when speaking about a particular topic, and was coded as negative, neutral or positive.

I then coded the category of each comment. Two categories emerged during coding: context and relationship quality indicators. Context comments were those that described the circumstance of the relationship or interaction that the respondent was discussing. Two subcategories emerged within context comments, scientist type and interaction type. Scientist type referred to the affiliation of the scientist that respondents were discussing (state, federal, university, etc.), and interaction type identified the setting of the interaction being discussed (public hearings, lobster zone meetings, observers on board, one-on-one, etc.).

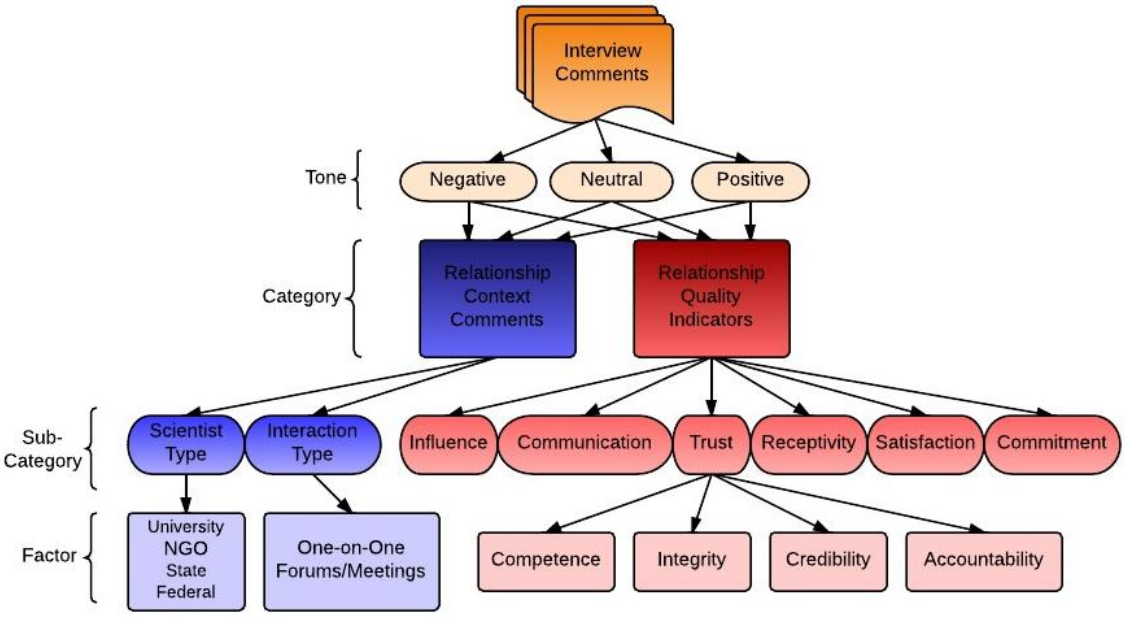

Figure 3. Coding framework.

Relationship quality indicator comments were those that alluded to the respondents' perceptions of the quality of fisherman-scientist relations. Relationship quality indicators first emerged as groupings of specific aspects of the relationship that fishermen were discussing. For example, comments detailing the nature of dialog between fishermen and scientists or their attitudes towards one another when conversing

were grouped as “communication comments”. As more comments were added to the grouping, an operational definition of communication was formed, and it became a relationship quality indicator. In total, six relationship quality indicators emerged throughout coding: commitment, communication, receptivity, influence, satisfaction and trust (Table 9).

Table 9. Relationship quality indicators

Relationship Quality Indicator	**Operational Definition**
Trust	Fishermen confidence in and acceptance of their own vulnerability to one another.
Receptivity	Fishermen/scientist open-mindedness to one another’s ideas and opinions.
Communication	Respectful, open and transparent on-going dialog between fishermen and scientists.
Influence	The power and influence fishermen perceive themselves as having within the relationship.
Satisfaction	Fishermen contentment with processes and outcomes associated with the relationship.
Commitment	Fishermen belief that the relationship is worthwhile.

Trust was by far the most prevalent relationship quality indicator, and it became apparent throughout coding that there were a variety of factors influencing respondents’ trust of scientists, or their perceptions of scientists’ trust of them. These factors are from here on discussed as trust factors. The four trust factors that emerged are competence, integrity, credibility and accountability (Table 10).

Table 10. Trust factors

Trust Factor	Operational Definition
Competence	Fishermen perception of the legitimacy and accuracy of scientist's knowledge.
Integrity	Fishermen perception of scientist's honesty, benevolence and selflessness.
Credibility	Fishermen perception of scientists as acting in an independent and impartial manner.
Accountability	Fishermen perception of whether scientists are held responsible for their actions.

Once coding was complete, the numbers of comments in each tone (negative, neutral, positive) were summed for all interviews and for each demographic variable (port, education attainment, age). The prevalence of relationship quality indicators and trust factors was assessed by two counts: (1) number of comments coded for each indicator or factor, (2) number of respondents mentioning each indicator or factor. For my analysis, relationship quality indicator counts provide insight into what indicators may have the most effect on the quality of the relationship. Similarly, trust factor counts provide insight into what factors may have the most effect on trust between fishermen and scientists. Direct quotes from respondents were also used to provide richer insight into the relationship between scientists and fishermen.

3.4.2 Limitations

Relationships are products of unique circumstances and actors, and as such vary greatly. Factors that may influence relationship quality between recreational fishermen and science institutions in Europe (e.g. Dedual *et al.,* 2012) may be distinctive from those that influence relationship quality between commercial fishermen and scientists in Maine. There can be some danger in applying theories developed from relationship case studies

when conducting region-specific research. While literature discussing relations between stakeholders and scientific and management institutions in the natural resource realm exists, there has been minimal research conducted on fisherman-scientist relations in the Northeast United States. As such, this thesis utilized the grounded-theory approach, aiming to avoid biasing results with preconceived assumptions.

There are, however, dangers to heed when utilizing grounded theory. As an iterative process of coding, stories told and comments made during interviews are subject to the researcher's own biases, opinions and interpretation. One could argue that results may not be as objective as those obtained from quantitative research methods. Furthermore, interviews conducted for this thesis were not voice-recorded to minimize discomfort of respondents. Interviews were recorded manually throughout the interview, possibly resulting in further researcher partiality. To triangulate qualitative results from the interviews and strengthen the overall findings, Likert-scale surveys were also administered.

CHAPTER 4: RESULTS

4.1 Respondent Characteristics

Eighteen fishermen were interviewed for this study. Six of the respondents reported Freeport as their homeport, six Harpswell and six Stonington. The average age of respondents was 52 (Table 11). Ten respondents (55.6%) were between the ages of 45-64, while four (22.2%) respondents were 21 to 44 years old and four (22.2%) were older than 65 (Figure 4a). Ten of the respondents received only a high school diploma, while four have continued with varying levels of college, and four have earned college degrees (Figure 4b).

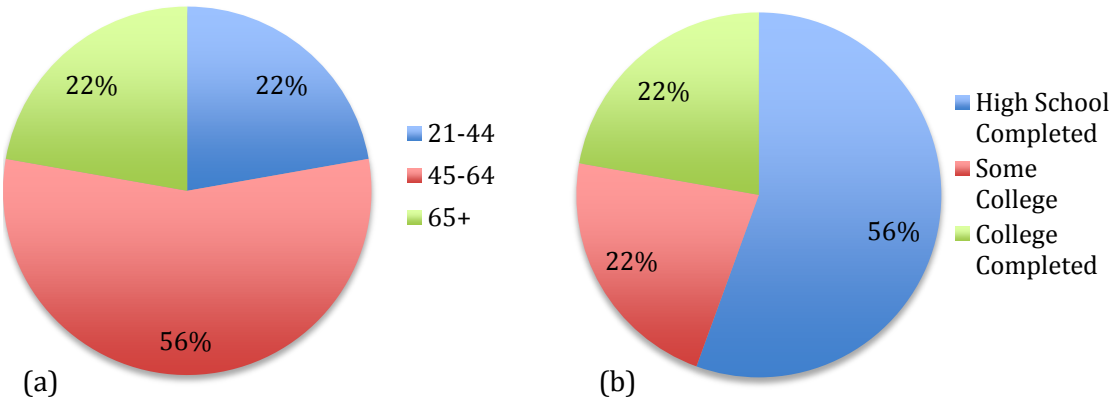

Figure 4. Respondent demographics by (a) age distribution and (b) level of education.

All respondents reported lobster as their primary fishery. Seven respondents (38.9%) have solely participated in the lobster fishery, while nine (50%) report having participated in a total of two to three fisheries and two (11.1%) in four to five (Table 11). Additional fisheries mentioned include: scallops (diving and dragging), groundfish (hooking, dragging and gillnetting), tuna (rod and reel), shrimp, urchins, clams, mussels, and elvers. On average, respondents have been fishing commercially for 28 years (Table 11).

Operational size was measured by four factors: boat size, crew size, number of traps set and average annual landings. Boat size ranged from 19 to 44 feet, and averaged 34 feet (Table 11). Crew size ranged from zero to two, and on average was one (Table 10). Respondents set between 140 and 800 lobster traps (800 is the maximum allowed), and on average set 650 (Table 11). Lastly, annual landings of lobster averaged 47,000 pounds, and varied from 2,000 to 150,000 pounds (Table 11).

Table 11. Respondent demographics, fishing activity and operation size

	Mean	SD	Min	Max
# of Fisheries	2	1.2	1	5
Years Fishing	28	14.9	9	51
Boat Size (ft)	34	7.0	19	44
Crew Size	1	.54	0	2
# Traps	650	237	140	800
Annual Landings (lbs)	47,000	38,000	2,000	150,000
Age	52	13.7	26	73

Notably, the demographics, fishing activity and operation size of the 18 respondents in this study are very similar to the nearly 700 Maine lobstermen surveyed by the Maurice *et al.* (2006), indicating a relatively representative sample of Maine lobstermen (see Appendix B).

4.1.1 Port Characteristics

Respondents' characteristics varied slightly by homeport. Harpswell fishermen were, on average, older than Freeport and Stonington fishermen, and, subsequently, had been commercially fishing the longest (Table 12). Though Stonington fishermen were on average younger than Freeport fishermen, respondents from both ports averaged 27 years fishing commercially (Table 12). The majority of Harpswell respondents had continued

their education beyond high school; three had taken some college and one had completed college (Figure 5). Half of Freeport respondents continued their education beyond high school; one had taken some college courses and two had completed college (Figure 5). Lastly, only one Stonington fishermen had continued his education beyond high school and finished college (Figure 5).

Average operation size of respondents from each port varied (Table 12). Harpswell fishermen averaged the smallest boat size, number of traps set, and annual landings. Freeport fishermen averaged the largest boat size and number of traps set. However, the average annual landings (70,000 lbs) of Stonington fishermen were significantly higher than both Harpswell and Freeport (Table 12).

Table 12. Fishermen characteristics by port. Values are averaged and rounded to the nearest whole number.

	Freeport	Stonington	Harpswell
# of Fisheries	3	2	2
Years Fishing	27	27	32
Boat Size (ft)	38	36	30
Crew Size	1	1	1
# Traps	700	675	570
Annual Landings (lbs)	43,000	70,000	28,300
Age	53	46	57

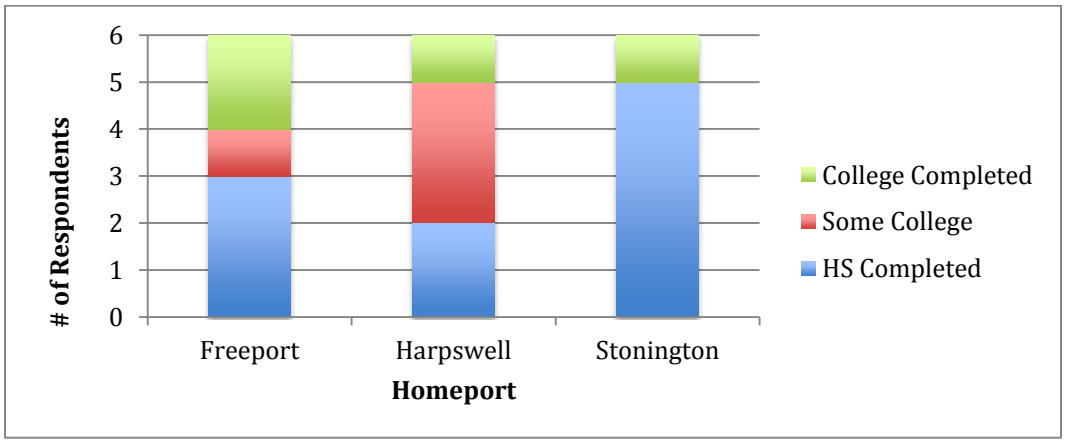

Figure 5. Respondent education level by homeport.

4.2 Survey Results

Overall, interviewees responded in a negative tone to survey statements. In particular, respondents tended to disagree with relationship statements (Figure 6a). On average, fishermen disagreed with the statements *fishermen trust scientists' motives (μ=2.3), scientists trust fishermen motives (μ=2.7), fishermen trust scientists' knowledge (μ=2.8),* and *communication between fishermen and scientists is open and transparent (μ=2.3)*. Interestingly, respondents disagreed more strongly with statements pertaining to *fishermen's* trust and respect of scientists more than they disagreed with statements pertaining to *scientist's* trust and respect of fishermen.

Reponses to trend statements tended to be neutral (Figure 6b). On average, respondents felt that relations, communication and respect between fishermen and scientists are getting neither worse nor better *(μ=3.1, μ=3.1, μ=3, respectively)*. However, respondents slightly disagreed that trust between both parties is improving *(μ=2.7)*.

Resource statement responses were varied (Figure 6c). In general, respondents tended to feel that the health of the lobster resource was good *(μ=4.2)*. However, recent market prices were generally scored between very poor and poor *(μ=1.6)*. As a result, respondents generally felt that the overall condition of the lobster fishery was slightly above average *(μ=3.4)*.

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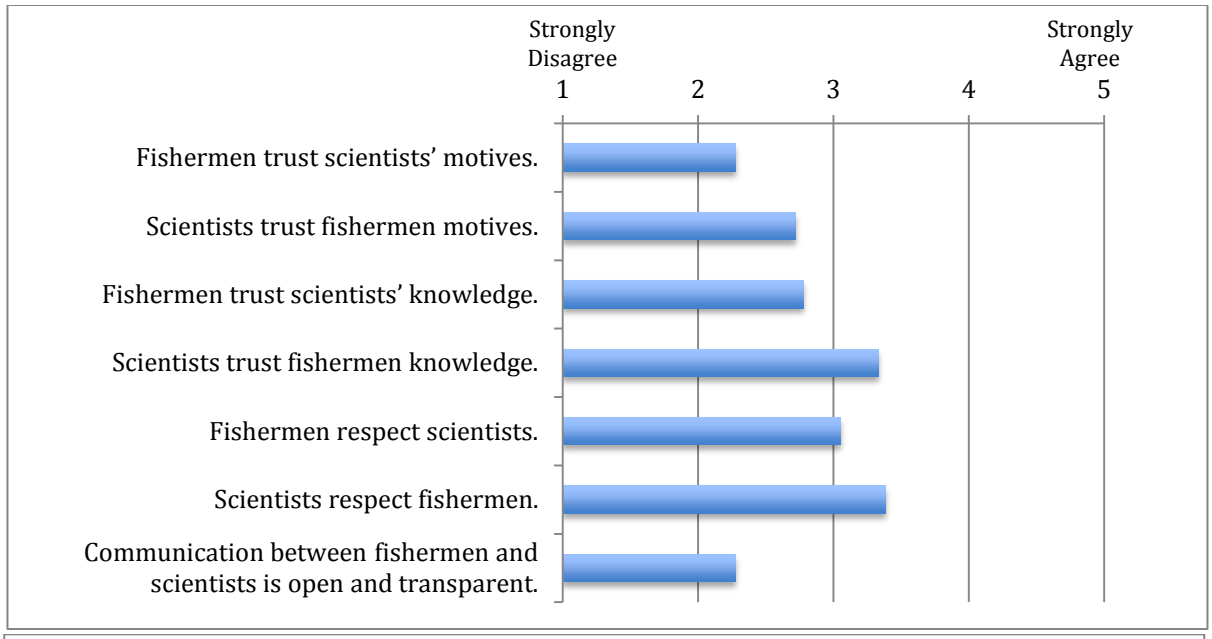

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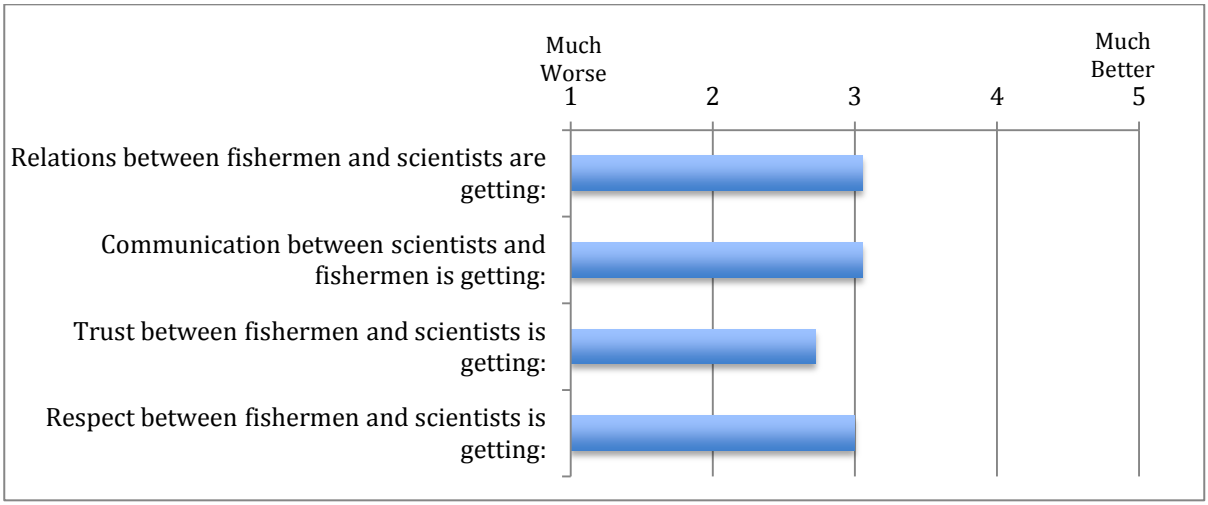

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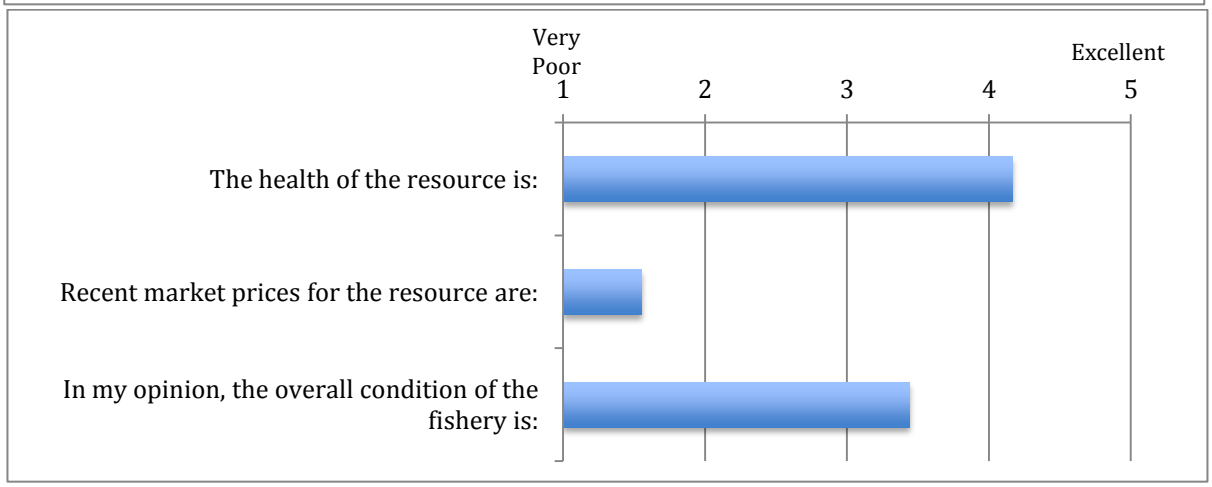

Figure 6. Average survey responses to (a) relationship, (b) trend and (c) resource statements.

4.2.1 Homeport

Stonington fishermen tended to be the most negative (i.e. disagree more and/or agree less) when responding to relationship statements than other respondents (Figure 7a). Notably, the only statement Stonington fishermen were more positive towards (yet still disagreed with) than other respondents was *communication between fishermen and scientists is open and transparent (μ=2.5).* On average, Freeport and Harpswell fishermen either agreed or neither agreed nor disagreed with all relationship statements, only disagreeing with *fishermen trust scientist motives (μ=2.2, μ=2.3, respectively)* and *communication between fishermen and scientists is open and transparent (μ=2.5, μ=2, respectively).*

Stonington fishermen were also the most negative of respondents towards trend statements (Figure 7b). On average, Stonington fishermen tended to believe that relations, communication, respect and trust between fishermen and scientists are getting worse *(μ=2.8, μ=2.7, μ=2.2, μ=2.5, respectively)*. Harpswell fishermen, however, generally felt that relations, communication, respect and trust are getting slightly better *(μ=3.5, μ=3.5, μ=3.2, μ=3.5, respectively)*.

Fishermen from all ports generally responded that the recent health of the lobster resource is good *(μ ≥ 4)* (Figure 7c). Conversely, respondents from all ports generally responded that recent market prices for the lobster resource are poor; Harpswell and Freeport fishermen *(μ=1.2, μ=1.5, respectively)* responding slightly more negatively than Stonington fishermen *(μ=2)*. Responses to the overall condition of the lobster fishery were more varied. Freeport fishermen generally felt overall conditions were slightly below average *(μ=2.8)*, and Harpswell fishermen generally felt they were slightly above

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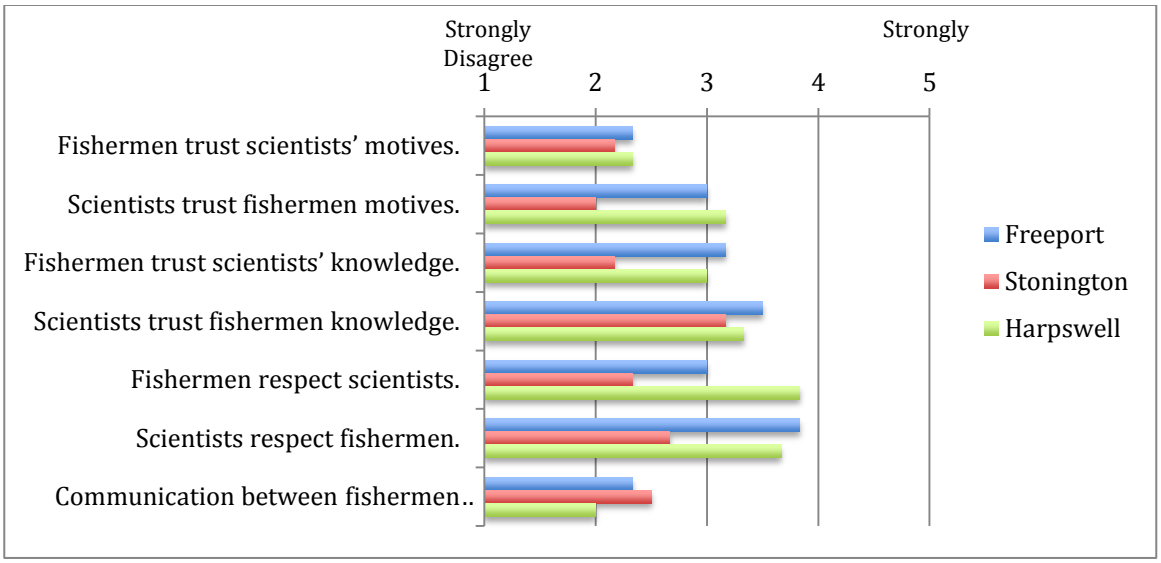

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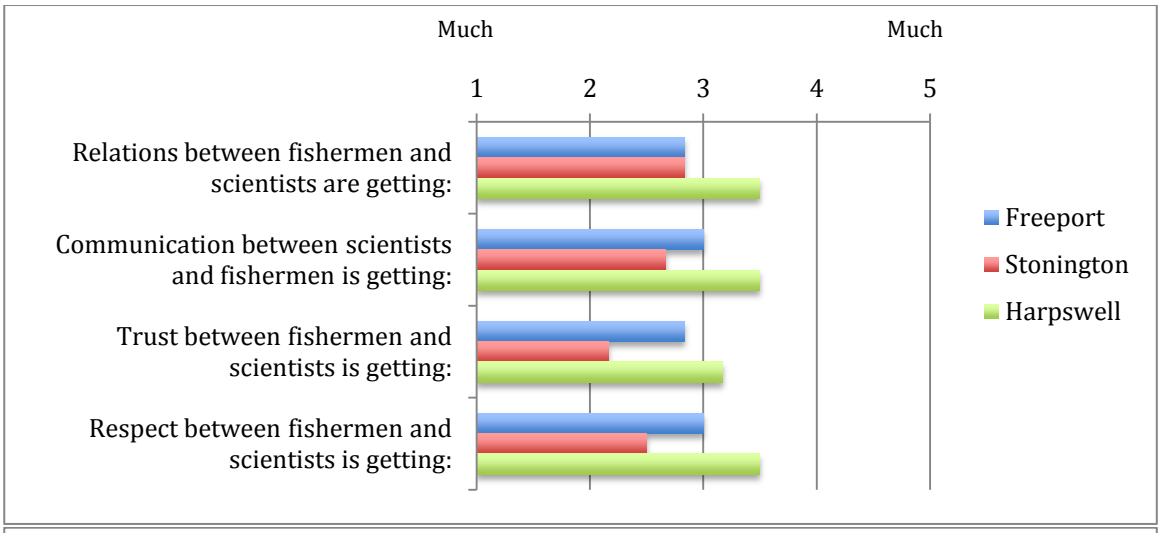

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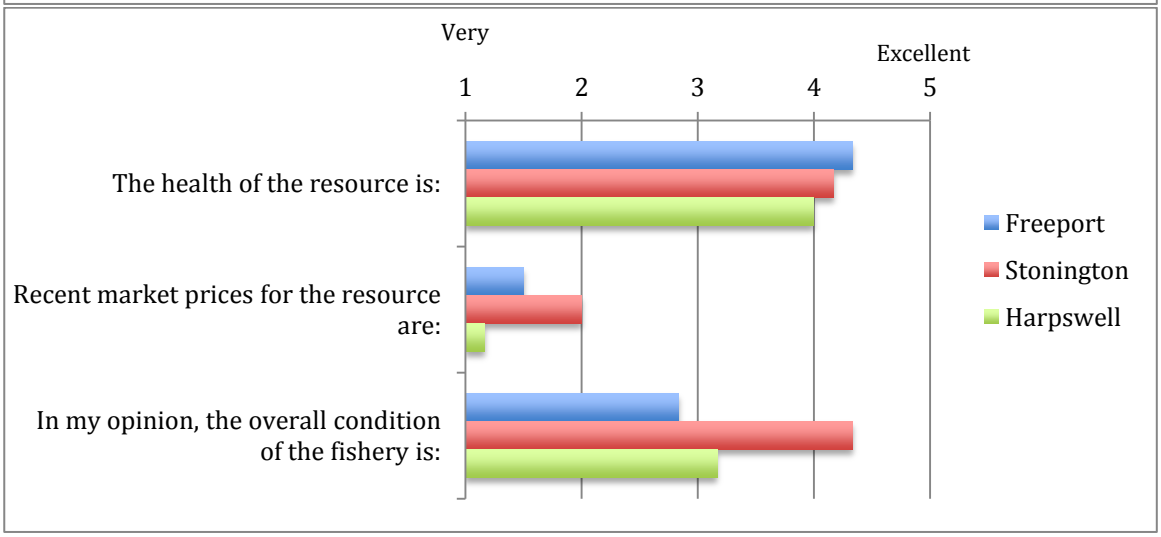

Figure 7. Survey responses to (a) relationship, (b) trend and (c) resource statements by port.

average *(μ=3.2)*. Notably, Stonington fishermen tended to feel the overall condition of the fishery was between good and excellent *(μ=4.3)*.

4.2.2 Age Group

Fishermen from the ages of 21 to 44 tended to be the most positive when responding to relationship statements, only disagreeing with the statements *fishermen trust scientists' motives* and *communication between fishermen and scientists is open and transparent (μ=2.5, μ=1.8, respectively)*(Figure 8a). Notably, *communication between fishermen and scientists is open and transparent* was the only statement that 21 to 44 year-old fishermen responded more negatively to than other respondents. Conversely, fishermen from the ages of 45 to 64 responded the most positively to *communication between fishermen and scientists is open and transparent (μ=2.5),* yet generally had the most negative responses to all other relationship statements.

As with relationship statements, younger fishermen tended to be the most positive when responding to trend statements, feeling that relations, communication, respect and trust between fishermen and scientists was either staying the same or improving *(μ=3.8, μ=3.8, μ=3.0, μ=3.5, respectively)*(Figure 8b). Older respondents (65+) also responded positively to trend statements. Fishermen from the ages of 45 to 64, however, generally felt that relations, communication, respect and trust between fishermen and scientists are getting worse *(μ=2.7, μ=2.6, μ=2.4, μ=2.6, respectively)*.

All age groups tended to feel that the health of the lobster resource is good *(μ ≥4)*, responses becoming more positive the younger the age group (Figure 8c). Similarly, all

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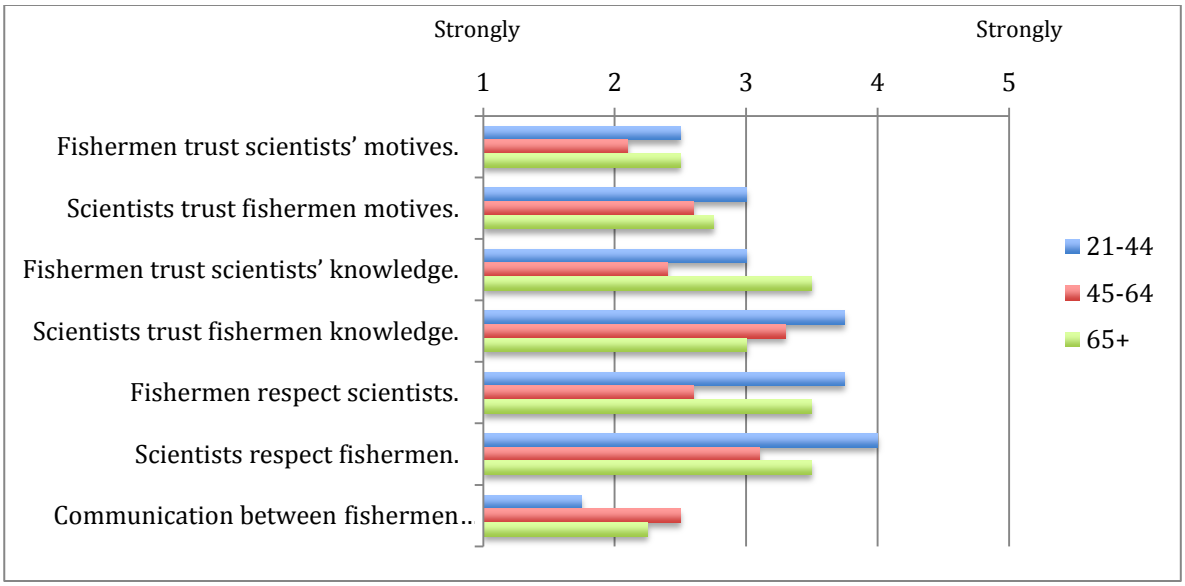

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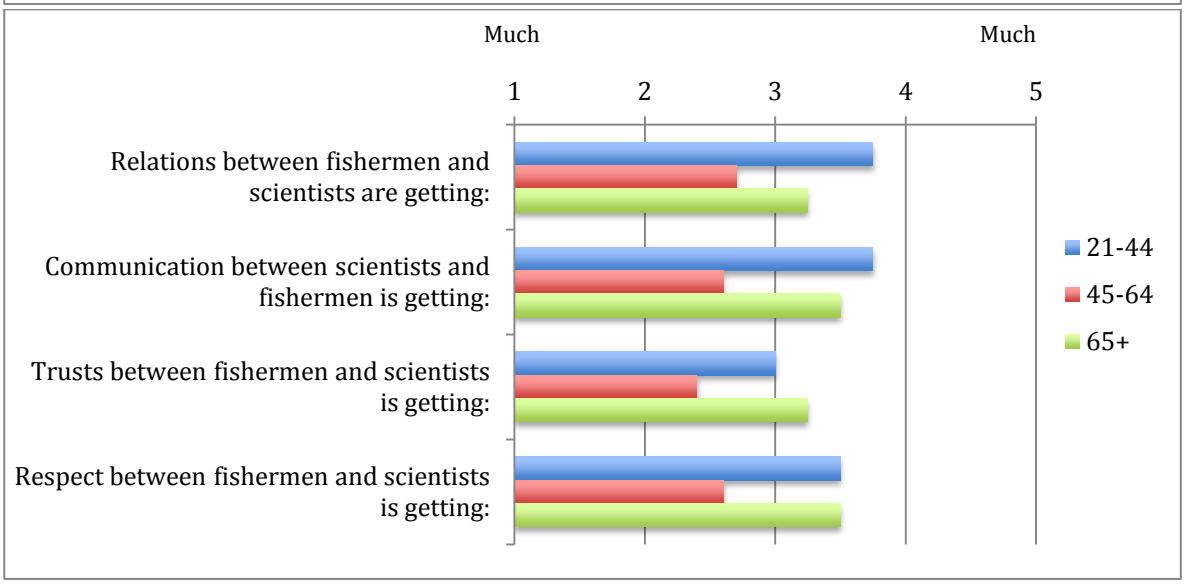

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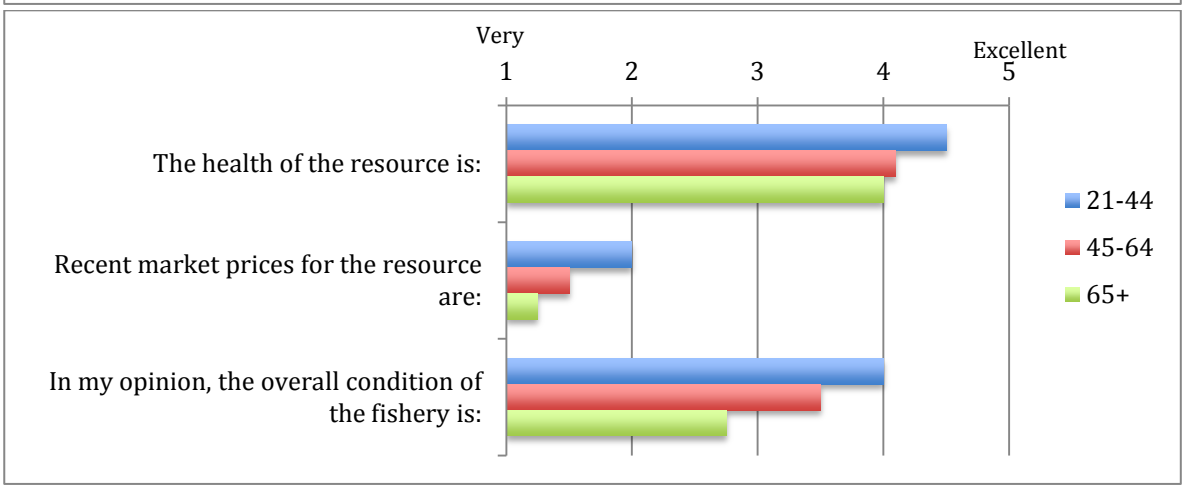

Figure 8. Survey responses to (a) relationship, (b) trend and (c) resource statements by age group.

age groups generally felt that the recent market prices of lobster are poor *($\mu \leq 2$)*, responses becoming more negative the older the age group. Responses to the overall condition of the lobster fishery varied. Younger fishermen tended to feel that the overall condition is good, while respondents from the ages of 45-64 generally felt conditions are slightly above average and older (65+) fishermen that overall conditions are slightly below average *(μ=4.0, μ=3.5, μ=2.8, respectively).*

4.2.3 Education Attainment

Respondents that did not complete school beyond high school tended to be the most negative of all respondents when responding to relationship statements, on average not agreeing with any of the statements *($\mu \leq 3$)* (Figure 9a). Conversely, fishermen with some college completed were generally the most positive, either agreeing with or neither agreeing nor disagreeing with all relationship statements except *communication between fishermen and scientists is open and transparent (μ=2).* Respondents who had completed college were also generally positive, only disagreeing with the statements *fishermen trust scientists' motives* and *communication between fishermen and scientists is open and transparent (μ=2, μ=2.8, respectively).*

Fishermen that did not complete school beyond high school on average felt that relations, communication, respect and trust between fishermen and scientists are getting slightly worse, and were the most negative of all age groups *(μ=2.8, μ=2.8, μ=2.3, μ=2.5, respectively)* (Figure 9b). Fishermen that completed college and some college on average felt that relations, communication, respect and trust between fishermen and scientists are either staying the same or getting slightly better *($\mu \geq 3$).*

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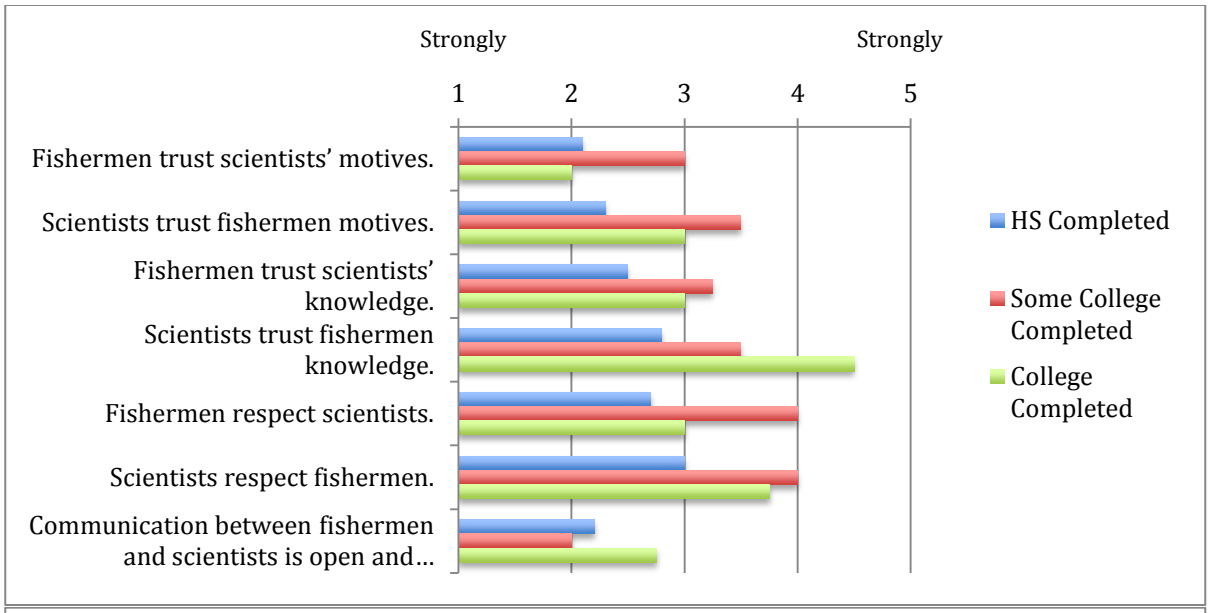

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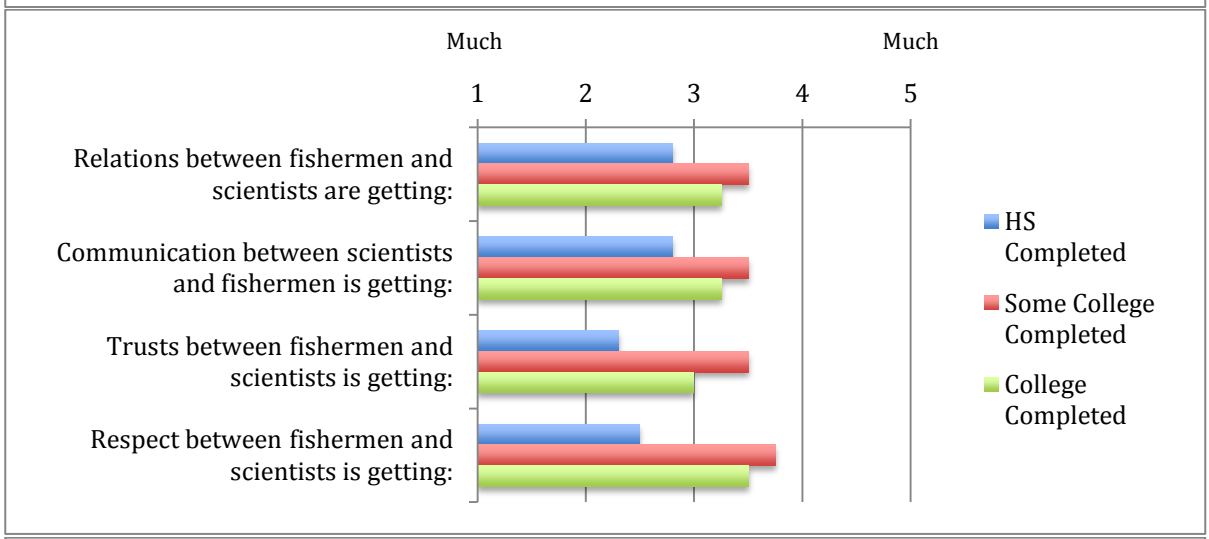

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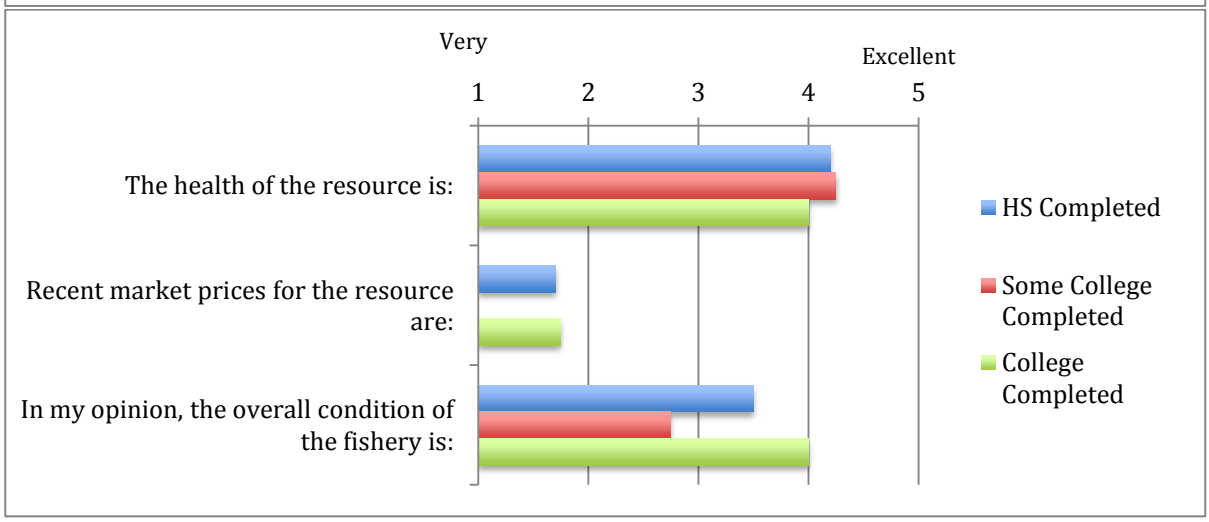

Figure 9. Survey responses to (a) relationship, (b) trend and (c) resource statements by age group.

Respondents of all education levels generally felt that the health of the lobster resource was good *($\mu \geq 4$)* (Figure 9c). Conversely, respondents of all education levels tended to feel that recent market prices were poor *($\mu > 2$)*, those with some college completed feeling the most negative *($\mu = 1$)*. Fishermen with some college completed were also the most negative about the overall condition of the lobster fishery, on average responding that conditions are below average *($\mu = 2.8$)*. Respondents with college completed and with only high school completed tended to feel the overall condition of the fishery is good *($\mu = 4$, $\mu = 3.5$, respectively)*.

4.3 Interview Results

Based on the coding of comments by tone, fishermen generally perceived fisherman-scientist relations in Maine in a negative manner. Of the 322 comments transcribed and coded, 229 (71.1%) were negative, 32 (9.9%) neutral, and 61 (18.9%) positive. While negative tones always dominated, the percentage of positive versus negative comments tended to vary depending on port, education level, and age group (Figure 10).

Tone patterns emerging from interviews tend to coincide with those that emerged from survey responses. Fishermen from Stonington tended to be the least positive respondents during interviews, and those from Harpswell the most positive. Fishermen who had not completed school beyond high school tended to be the most negative respondents during interviews, and those with some college the least negative. Tone by age group is the least varied; however, respondents from the ages 45 to 64 tended to be slightly less positive than others.

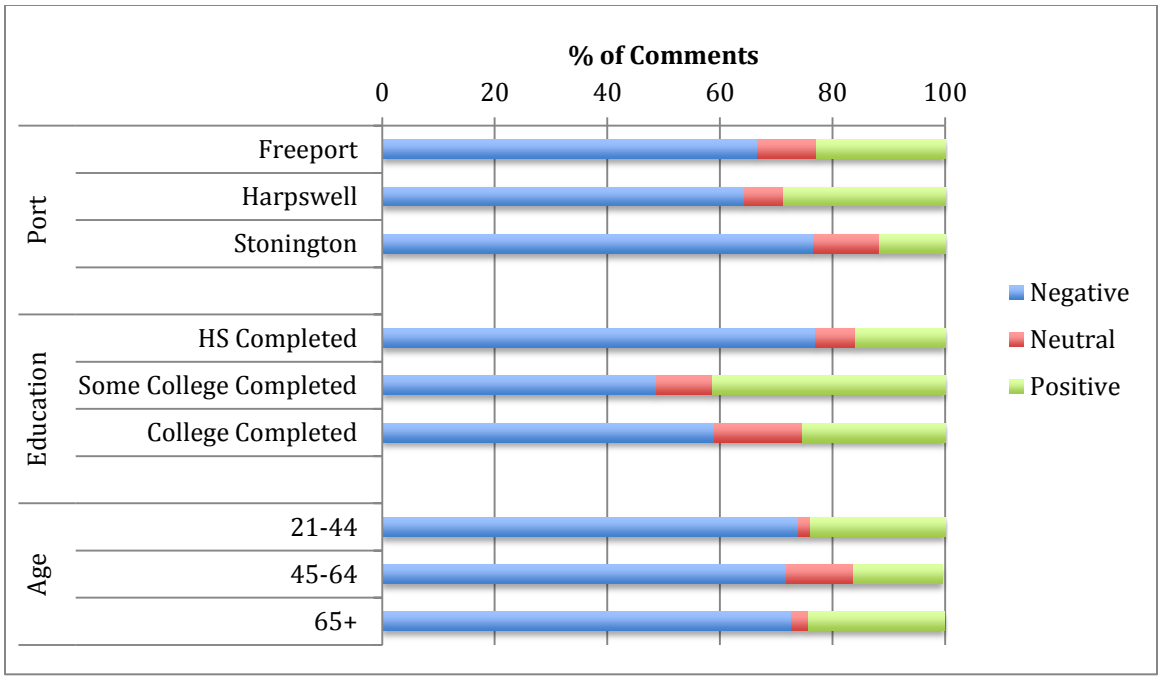

Figure 10. Tone of interview comments by port, education level and age group.

Of the total comments made by interview respondents, 12.4% were categorized as context comments and 87.6% were categorized as relationship quality indicators. Notably, the tone of context comments varied according to interaction type and scientist type. When discussing one-on-one interactions, such as having observers on board their vessel, respondents generally did so in a positive manner. However, when discussing interactions occurring in meeting settings, such as Zone Council meetings and DMR hearings, respondents adopted a negative attitude. In the case of scientist type, respondents tended to be positive when discussing interactions with University and NGO scientists, and negative when discussing interactions with State and Federal scientists.

4.3.1 Relationship Quality Indicators

Interviews were dominated by comments related to the quality of a respondent's relationship with scientists (relationship quality indicators). The six relationship quality

indicators that were developed throughout the coding of interviews include trust, receptivity, communication, influence, satisfaction and commitment (Table 13). Indicators most often emerged as either respondents' own perceptions of fisherman-scientist relations, or as respondents' beliefs of scientists' perceptions of the relationship.

Of all the indicators, trust was discussed most often, accounting for 53% of total indicator comments, and mentioned by all respondents (Table 13, Figure 11). Though the remaining five indicators were each mentioned by over half of the respondents, none accounted for more than 13% of total indicator comments (Table 12, Figure 11).

Table 13. Descriptions of relationship quality indicators and the number of respondents mentioning each.

Relationship Indicator	**Operational Definition**	**# Respondents (n=18)**
Trust	Fishermen confidence in and acceptance of their own vulnerability to one another.	18 (100%)
Receptivity	Fishermen/scientist open-mindedness to one another's ideas and opinions.	16 (88.9%)
Communication	Respectful, open and transparent dialog between fishermen and scientists.	12 (66.6%)
Influence	The power and influence fishermen perceive themselves as having within the relationship.	10 (55.6%)
Satisfaction	Fishermen contentment with processes and outcomes associated with the relationship.	14 (77.8%)
Commitment	Fishermen belief that the relationship is worthwhile.	10 (55.6%)

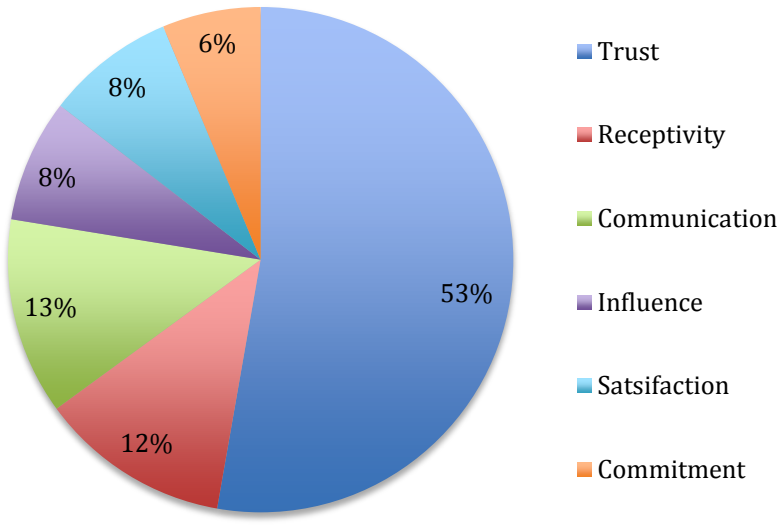

Figure 11. Relative frequency of relationship quality indicator comments.

4.3.1.1 Receptivity

Receptivity relates to the open-mindedness of fishermen and scientists toward one another's ideas and knowledge. Receptivity was mentioned by 16 of the 18 respondents, and accounted for 12% of all relationship quality indicator comments (Table 13, Figure 11). The majority of receptivity comments were mentioned in a negative manner.

The majority of respondents tended to feel that scientists are not willing to consider comments and suggestions made by fishermen. During one interview, a Stonington fisherman expressed frustration when discussing his attempts to contact and collaborate with scientists, stating: "To get someone to listen to you, especially if what you are saying goes against the grain, is impossible."

In particular, respondents' perceptions of scientist indifference towards fishermen derived from experiences at meetings (such as DMR public hearings) in which scientists listened to comments, but refused to further acknowledge them or respond. As one

Harpswell fishermen noted when discussing interactions with scientists at meetings, “We are out there everyday, and we tell ‘em what’s what and they just ignore us and assume they are right.” Similarly, a Stonington fisherman stated of meetings, “Each side just says what they want and ignores the other.”

Positive mentions of scientist receptivity almost always occurred when respondents were discussing one-on-one interactions with scientists. When discussing such interactions, fishermen often felt scientists afforded them more respect and were more willing to engage in meaningful dialogue.

4.3.1.2 Communication

Communication relates to respectful and transparent dialogue between fishermen and scientists. Communication was mentioned by 12 of the 18 respondents, and accounted for 13% of all relationship quality indicator comments (Table 13, Figure 11). The majority of communication comments were mentioned in a negative manner.

Most respondents indicated that communication was poor between fishermen and scientists during meeting interactions. It became evident throughout most interviews that poor communication quality was, in large part, due to an actual *lack* of interaction that occurs at meetings. For instance, a Stonington fisherman noted, “There’s not a whole lot of interaction at meetings- scientist speak their piece, lobstermen speak theirs, and that is that.”

Respondents frequently cited a fisherman’s tendency to become impatient and “hot” at meetings as a hindrance towards productive and meaningful dialogue. Fishermen also expressed that scientists, particularly those from “outta state”, do not respond well to

the often blunt and harsh demeanor of most fishermen. Diversity of opinion among fishermen was also discussed as a barrier to communication. As one Stonington fisherman noted: "Lobstermen are fiercely individualistic, which can overwhelm scientists and managers in meetings, and then they just shut off to what guys [fishermen] are saying."

The perceived attitude of scientists was also referenced as presenting a barrier to achieving quality dialogue between both parties. Many respondents expressed distaste towards the manner in which scientists seemed to present themselves, which they said discouraged their own efforts towards positive communication. As a Harpswell fisherman concluded when discussing meetings: "It's a lot how they [scientists] present themselves. If they come down with a 'know it all' attitude they aren't going to be received well. If they are relaxed and open, things will go okay."

Lastly, respondents often expressed frustration at the manner in which scientists relate their knowledge. Many felt that scientists do not thoroughly explain their research and results, and utilize "scientific jargon" that fishermen are not familiar with.

Positive communication comments almost always occurred when respondents were discussing their one-on-one interactions with scientists. During these interactions, respondents expressed that communication was more amiable and open, and noted a sense of mutual respect. Furthermore, respondents who mentioned communication positively often commented that scientists were speaking on "the same level" as them.

4.3.1.3 Influence

Influence relates to fishermen's perceptions of the level of power and voice they hold within the scientist-fishermen relationship. Influence was mentioned by 10 of the 18 respondents, and accounted for 8% of all relationship quality indicator comments (Table 13, Figure 11). Influence was always discussed in a negative manner.

Many respondents expressed continual frustration with the level of powerlessness they felt when interacting with scientists, noting that no matter what fishermen do, nothing ever changes or goes their way. Often, respondents noted a greater sense of powerlessness when confronted with scientists at meetings. One Stonington fisherman commented, when discussing meetings; "They'll [scientists] listen to us, but don't do anything. Everything we say or do just gets filed in the back- they're going to do what they're going to do." The same fisherman also expressed perplexity that scientists continue the "charade of caring", saying: "It doesn't make much sense to have these meetings when they're going to do whatever [they want] anyways." Another Stonington fisherman felt that "if fishermen have more voice, more power, then more would attend meetings and there would be more cooperation [among scientists and fishermen]."

4.3.1.4 Satisfaction

Satisfaction relates to fishermen's contentments with the processes and outcomes associated with their interactions with scientists. Satisfaction was mentioned by 14 of the 18 respondents, and accounted for 8% of all indicator comments (Table 13, Figure 11). Interestingly, 40% of satisfaction comments made were positive, a relatively high percentage amongst relationship quality indicators.

Negative satisfaction mentions often revolved around respondents' discontent with their inability to effect any change. Many respondents also expressed frustration that interactions with scientists had not fulfilled their expectations.

Positive satisfaction was most frequently mentioned when respondents were discussing one-on-one interactions with scientists. One Stonington fisherman discussed his gratification in working with a University scientist, stating:

> "I love to have scientists on board- we can all learn a lot from each other. I took out a UNH scientist on my boat once and [we] went diving. We both learned a lot. I've been fishing a long time, and I learned a ton."

Similarly, a Freeport fisherman related the positive experience of having observers aboard his vessel: "I've taken observers out and done surveys- it was no problem, I liked seeing them do their work, and appreciated them getting into the field."

Notably, younger respondents tended to discuss satisfaction in a more positive manner than most. One respondent in his twenties explained this, stating: "I don't feel as restricted by regulations or as negative toward scientists [as older fishermen] because it has always been this way for me. I think many people my age feel similarly."

4.3.1.5 Commitment

Commitment relates to fishermen's belief as to whether the relationship is worthwhile or not. Commitment was mentioned by 10 of the 18 respondents, and accounted for 6% of all indicator comments (Table 13, Figure 11). The majority of commitment comments were mentioned in a negative manner.

Respondents who expressed little belief that fisherman-scientist relations are worthwhile cited time and effort constraints and their own indifference and perceived

powerlessness as primary drivers. Those indifferent to the relationship often stated opinions of wanting to "stay out of the drama" and "just go to work, come home, and be left alone." Other respondents indicated they had been driven to not care, as one Stonington fisherman commented: "I don't go to meetings anymore because scientists weren't listening to what anyone had to say, and nothing was changing."

Frequently respondents expressed lack of commitment to the relationship by stating they lack both time and money. One Harpswell fisherman noted that it is "too expensive to go to meetings" and that he could "not afford to be driving around and not be fishing for days." Others disagreed with having to do extra work without receiving compensation, feeling that more and more they are doing scientists' jobs for them.

Positive commitment was most frequently mentioned when respondents were discussing their desires to work toward sustaining both the ecosystem and industry. One Stonington fisherman in particular spoke in-depth about conservation projects he has been involved in, and emphasized his willingness to work with scientists further on such efforts.

Respondents also expressed a desire to work with scientists so that both parties could continue to learn from one another. When asked if he would be willing to participate in cooperative research efforts, a Harpswell fisherman responded, "If approached, I would. I would appreciate scientists knowing first hand what I do every day." Similarly, another Harpswell fisherman noted, "As well as to continue learning, fishermen want to work with scientists to save the industry."

4.3.1.6 Trust

Trust was by far the dominant relationship quality indicator discussed by the respondents. Respondents discussed fishermen's distrust of scientists as well as their perceptions of scientists' distrust of fishermen. Throughout these discussions, four distinct factors emerged that seemed to influence fishermen's trust and distrust of scientists: competence, integrity, credibility, and accountability (Table 14).

Table 14. Descriptions of trust factors and the number of respondents mentioning each.

Trust Factor	Operational Definition	# Respondents (n=18)
Competence	Fishermen perception of the legitimacy and accuracy of scientist's knowledge.	18 (100%)
Integrity	Fishermen perception of scientist's honesty, benevolence and selflessness.	13 (72.2%)
Credibility	Fishermen perception of scientist's as acting in an independent and impartial manner.	13 (72.2%)
Accountability	Fishermen perception of whether scientists are held responsible for their actions.	9 (50%)

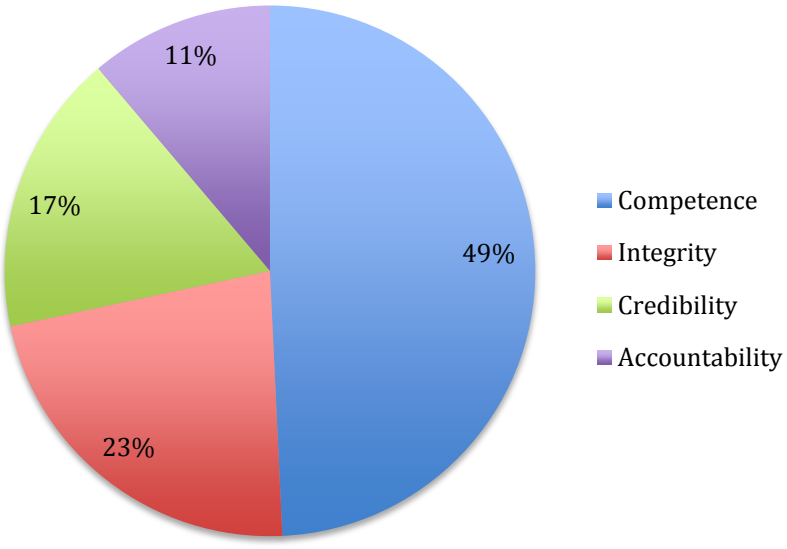

Figure 12. Relative frequency of trust factor comments.

4.3.2 Trust Factors

4.3.2.1 Competence

Comments coded for competence are those pertaining to fishermen's and scientists' perceptions of each other's knowledge as legitimate. Competence was mentioned by all respondents when discussing trust, and accounted for almost fifty percent of total trust comments made (Table 14, Figure 12). Generally, competence was discussed as either the respondent's own perception of scientist's knowledge, or the respondent's speculations of scientists' perceptions of fishermen's knowledge.

When discussing their own opinions, respondents most often did so negatively, criticizing a variety of aspects of scientist's competence. Many respondents expressed continual frustration with fish surveying and stock assessment methods. Respondents frequently noted that scientific methods lacked common sense, both temporally and spatially. In particular, respondents recounted witnessing survey trawls conducted in areas where there are no fish, and during off-seasons. As a Stonington fisherman questioned, "Would you go down to the Louisiana bayou and look for giraffes?"

Perplexity was further expressed towards not only the methods by which surveys are conducted, but also the manner by which data are then used. When one Freeport fisherman was asked to elaborate on his frustration with scientific methods, he replied:

> "Well the science of trawls is totally ludicrous. Take one day, I'm hauling offshore and see a research trawl. I've got 36 fish to their one, and there's the first problem. And then they've got this phony formula they use on this phony data- you can't apply formulas to nature."

A Harpswell fisherman expressed similar frustration when discussing the use of fisheries dependent data, saying, "They look at our landings data and think they know stuff, and then they recommend rules based on bogus data." He went on to discuss the

absurdity of using landings data to compute stock populations, arguing that landings do not equate to fish populations.

Respondents also noted scientists' lack of experience on the water when mentioning competence. It was evident that the fishermen in this study placed high value on experience-based knowledge, which most found scientists severely lacking in. As one Freeport fisherman explained when discussing scientists' knowledge base: "I'm not saying scientists don't know anything. They know about biology. But as far as what is really going on in the water, they know nothing." A Stonington fisherman aired similar grievances, stating, "I have heard scientists say its been over a decade since they went groundfishing, but then they turn around and think they know something about what it's like out there now."

Issues of experience-based knowledge also emerged when respondents discussed discrepancies between what scientists are saying and what fishermen are seeing. Many respondents expressed difficulty believing scientific results, when they themselves often see the opposite on their vessels. One Freeport fisherman illustrated this when discussing the number of protected egg-bearing female lobsters in Maine waters, saying, "I cannot believe it when scientists say there are only so many V-notched lobsters in the water when we pull up a ton in our traps everyday." Similarly, a Stonington fisherman, who has participated in a multitude of fisheries, discussed his recent exploratory fishing trips within Maine waters:

> "Everyone everywhere is saying there is no cod, but I have been up and down the coast and on and off shore looking, and I have seen cod everywhere. I could've rowed my boat with cod, there was so much."

Misgivings towards scientists' competence were also expressed by respondents' perceptions of scientist's arrogance. Respondents criticized that fishermen see holes in scientific knowledge that scientists refuse to acknowledge. As a Stonington fisherman expressed:

> "No one's got it figured- we don't know, they don't know. But the difference is they think they know. Even the guys [fishermen] out doing it everyday, closest to it all, don't know everything and can admit it. But scientists can't [admit it]."

Another Stonington fisherman alluded to scientist arrogance when he commented:

> "I think scientists for the most part trust fishermen's knowledge, but they don't want to hear it always because they don't want to know the truth, especially when it goes against what their science tells them."

When discussing scientists' perceptions of fishermen's competence, respondents often expressed belief that scientists think fishermen uneducated and therefore unknowledgeable. This idea was bolstered by the fact that respondents have not witnessed scientists asking fishermen to aid in survey/stock assessment development and methods. One Harpswell fisherman lamented:

> "Just because we don't talk fancy and don't have a fancy degree, doesn't mean we don't know what is what. We are out there everyday, yet they don't think our knowledge is worth listening to."

Respondents also specified language as a significant barrier in scientists' positive perceptions of fishermen's competence. One Stonington fisherman in particular discussed this at length, stating at one point:

> "There are some fishermen that are very smart fishermen, and know the ocean better than most, but they are very illiterate, cannot express themselves well in written or spoken word, so their knowledge of the ocean ecosystem gets disregarded [by scientists]."

Only two fishermen mentioned competence positively. Positive comments were nondescript; one fisherman stating, “They seem to know what they are talking about” and the other commenting, “I don’t generally disagree with the science stuff I read.”

4.3.2.2 Integrity

Comments coded as integrity most often pertained to respondents’ perceptions of scientists’ selflessness, honesty and benevolence towards fishermen. Integrity was the second most frequently mentioned trust factor, accounting for 23% of total trust comments and mentioned by 13 of the 18 respondents (Figure 12, Table 14). Overall, integrity was discussed in a negative manner, with only 3 of 13 respondents mentioning the factor in a positive light.

Respondents most frequently discussed scientist integrity in terms of selflessness/selfishness. As one Freeport fisherman discussed:

> “I don’t trust them [scientists] because there are no consequences for them, so what does it matter to them? They are just looking out for themselves.”

A Stonington fisherman elaborated on this concept, saying:

> “If scientists went to work everyday and weren’t finding any change or weren’t proving anything, then they wouldn’t have a job, so they go out and look for problems. Their job is to get information, whether it is right or wrong.”

Another Stonington fisherman reiterated perceptions of scientist self bias, stating:

> “More and more they are just looking out for themselves, rather than the well-being of fishermen. […] Seems to me they just keep creating problems so they can solve them and keep their job.”

Many respondents took discussions of scientist self bias a step further, expressing the belief that scientists are specifically "out to get us". A Stonington fisherman demonstrated this mentality, stating:

> "State and feds are just licking their chops, waiting for things to go bad so they can say 'I told you so'. But things just keep getting better, and they keep getting more frustrated because it'll mean less regulations for us [fishermen]."

A few respondents mentioned their belief that scientists perceive fishermen as self-biased. While these comments were brief, the respondents were certain that scientists believe fishermen to be concerned only with their own well-being rather than conservation of the resource.

Lastly, some respondents expressed frustrations with what they see as scientist dishonesty. One Freeport fisherman in particular mentioned multiple occasions in which he felt lied to by scientists, recounting: "I have heard scientists saying one thing in private, but then towing another line in public when discussing management recommendations."

Positive integrity comments made by respondents were brief and fleeting. However, such comments generally acknowledged the difficult position today's scientists are in, and that, despite being misinformed, they are "probably alright guys".

4.3.2.3 Credibility

Comments coded as credibility were those that referenced respondents' perceptions of scientists' impartiality. Credibility was mentioned by 13 out of 18 respondents, and accounted for 17% of all trust factor comments (Table 14, Figure 12). Overall, credibility was discussed in a negative manner, only two of 13 respondents

mentioning the factor in a positive tone. In particular, two themes emerged when respondents discussed scientist credibility: management-bias and conservation-bias.

The majority of respondents were concerned by what this thesis has termed "management-bias", in which scientists are perceived as too closely linked with management entities and decision-making to act impartially. Though not all respondents cited management-bias directly, all respondents mentioned management and regulations when asked scientist-specific questions.

When discussing management-bias directly, respondents asserted that "they [scientists and managers] come from the same building up there" and are "pretty much in each other's pockets". Stonington fishermen in particular were adamant that scientists are management "puppets", one fisherman stating: "If managers want to make certain cuts or regulations, scientists will search for the proof to back them up."

Conservation-bias indicates respondents' perceptions that scientists are inclined to value conservation above all else, and therefore lack credibility. Conservation-bias often emerged in comments related to the validity of scientific results and management suggestions. For instance, one Freeport fisherman, when discussing "science-backed regulations", stated: "They are putting us out of business for the sake of conservation, whether or not it is actually necessary."

Respondents made only two positive credibility comments. One Freeport fisherman felt that management bias is lessening, stating; "These days science is becoming a matter of best science rather than trying to get grant money etc. It is less bureaucratic." Another Freeport fisherman expressed his preference towards non-

governmental scientists, saying; "I feel better about university and NGO science. It is more exploratory and open, and less connected to regulations."

4.3.2.4 Accountability

Accountability relates to fishermen's perceptions of whether scientists are responsible for and affected by their own actions. Accountability was mentioned by half of the respondents, and accounted for 11% of all trust factors comments (Table 14, Figure 12). Accountability was always discussed in a negative manner.

Specifically, respondents mentioning accountability expressed suspicion towards scientists, as they believe that when scientists report incorrect findings (which are in turn the basis of regulations), only fishermen suffer the consequences. In one interview, a Freeport fisherman commented: "The decisions made based on science and scientists' suggestions are only costing the fishermen, not the scientists." Furthermore, respondents expressed a desire for scientists to be held accountable for their mistakes.

CHAPTER 5: DISCUSSION

5.1 Overview

Six relationship quality indicators emerged in the interviews: trust, receptivity, communication, influence, satisfaction and commitment (Table 9). Of the six relationship quality indicator categories that emerged, trust was by far the most prevalent. Communication, receptivity and influence were also important indicators. The four trust factors that emerged in the interviews included competence, integrity, credibility and accountability (Table 10). Overall, fishermen in this study discussed fisherman-scientist relations in a negative manner throughout the interviews. Perceptions of relationships varied depending on a variety of factors, including fishermen's characteristics, fishery conditions and the context of the fisherman-scientist interaction being discussed (Figure 13).

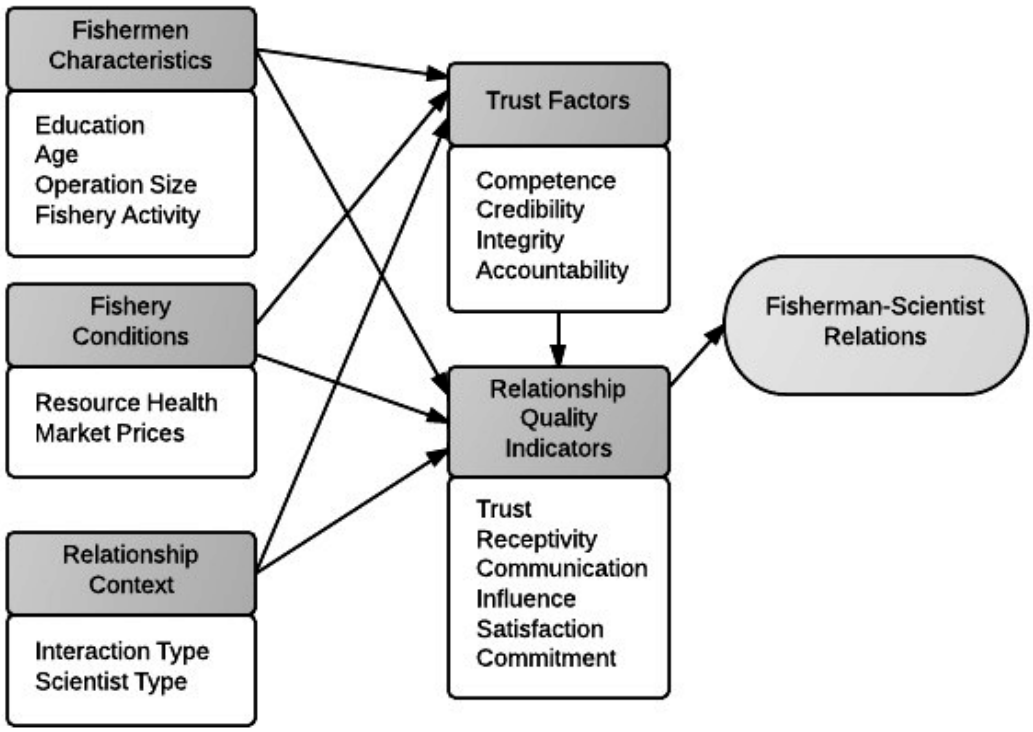

Figure 13. Potential factors influencing fisherman-scientist relations.

The following sections will explore the potential effects of a variety of factors on relationship quality and fishermen's perceptions of relations. The emergence of relationship quality indicators and trust factors and their connectivity to previous relationship studies will also be discussed. Lastly, suggestions will be made towards improving relations between fishermen and scientists, and towards potential future research efforts.

5.2 Effects of fishermen characteristics on perceived relationship quality

The trends that emerged when analyzing results by varying fishermen demographics shed light on possible factors affecting fishermen's perceptions of fisherman-scientist relationships. In particular, examining how perceptions vary by port may be quite telling.

There were two fishermen characteristics within the three ports in this study in which differences are notable: annual landings of lobster and fisherman's level of education. Harpswell fishermen in this study had received the most education (only two out of six not receiving education beyond high school) and landed the least lobster annually (28,300 lbs.), and were the most positive about fisherman-scientist relations. Stonington fishermen, on the other hand, had received the least amount of education (only one out of six attaining education beyond high school) and landed the most lobster annually (70,000 lbs.), and tended to be the most negative about fisherman-scientist relations. Fishermen from Freeport fell in the middle on all fronts, averaging 43,000 pounds of landings annually, half receiving education beyond high school, and tending to be the most neutral regarding relations.

These results suggest a possible connection between fishermen's levels of education and fishing effort, and their perceptions of relations. It could be that Stonington fishermen average higher annual landings due to better resource health in colder, more northern waters. If high landings are in fact due to resource health, it is likely that the resource health could be influencing Stonington fishermen's negative perceptions of relations. It is also possible that Stonington fishermen are spending more time fishing and heading farther offshore than fishermen from Freeport and Harpswell, and hence landing more lobster. It is possible that those who invest more time and money into fishing are likely to perceive the fisherman-scientist relationship more negatively, particularly when scientists are perceived as being closely linked with management and regulation entities.

Fishermen's level of education likely plays one of the more important roles in fishermen's trust of scientists, and in relationship quality. The quantitative survey results and more qualitative interview results support each other, both showing that fishermen who have not had schooling beyond high school tend to perceive fisherman-scientist relations more negatively. This is likely due to the different type of knowledge that these fishermen hold; often a fisherman's experience-based understanding of science varies from that of scientists'. For instance, respondents with less education often expressed frustration over the methods used to conduct fish population assessments, not understanding why surveys occur in areas where there are likely no fish. While the justification of random sampling methods is well understood and accepted in the scientific world, those who are not trained in academic sciences are not likely to concur. It is possible that fishermen who attended college in this study, where they likely interacted with faculty who are scientists or took formal science courses, perceive science

and scientists differently from those who did not. These different understandings about science and scientists might hinder trust and communication between scientists and fishermen.

5.3 Effects of relationship context on perceived relationship quality

There were distinct trends throughout the interviews, connecting the way fishermen perceived relations with the context of the interactions they had had with scientists. Uniformly, fishermen discussed one-on-one interactions with scientists, such as having an observer aboard their vessel, as positive experiences. Fishermen described feeling that, in those instances, scientists were more communicative and open when interacting with them personally, emphasizing the importance of receptivity and communication within the fisherman-scientist relations. Similarly, in a study of stakeholder trust in fisheries science institutions in Europe, Glenn *et al.* (2012) touch on the desirability of 'strong ties', built from personal interactions, when fostering trust. Increased frequency of one-on-one interaction between scientists and fishermen seems to increase the transparency of communication and both parties' willingness to consider what one another have to say.

The majority of interactions discussed by respondents in this study were not one-on-one, but took place at some form of a meeting, such as a DMR public hearing. These interactions were most often discussed in a negative tone. It became evident throughout the interviews that fishermen felt powerless in these meetings, and often considered scientists' attitudes condescending. This is likely due to the format of such meetings, which were often described as panels of scientists and managers presenting data and proposed regulations, followed by a short period in which fishermen were able to voice

their concerns and opinions. Fishermen often noted the sense of powerlessness and inferiority that such meetings instill. Jacobson *et al.* (2012) discuss the idea of power and control between fishermen and scientists in their research on participatory fisheries science, finding that relations are likely to improve if fisherman-scientist interactions become more interactive and balanced. Similarly, Davenport *et al.* (2007) discuss limited engagement and power as deterrents towards building trust and strong relations in a natural resource context. As such, the lack of engagement and influence respondents of this study have experienced at meetings is likely an important factor affecting their perceptions of fisherman-scientist relations.

Not only did the fishermen interviewed report limited engagement with scientists, but none had ever participated in any form of cooperative research, or had even been asked to participate. A study on stakeholder trust in natural resource science and institutions found that participation in fisheries management was the most significant variable tested that predicted levels of stakeholder trust (Gray *et al.*, 2012). Such findings are likely parallel to fishermen's trust of scientists; those who have participated in cooperative research and fisheries science may be more apt to trust scientists. The lack of respondents' participation in cooperative research, therefore, may also be an important factor influencing the negative perceptions of fisherman-scientist relations found in this study.

5.4 Effects of resource health on perceived relationship quality

Gray *et al.* (2012) emphasized that level of resource health was related to relationship quality and levels of resource user trust towards science institutions, finding

that when a resource is perceived to be in good health, resource users will be more trusting of scientists. However, the results of this thesis suggest otherwise, at least for commercial fishermen within Maine.

Respondents across the three ports generally perceive the health of the lobster resource as good, and the overall condition of the fishery as just above average (Figure 6c). However, the majority of comments about fisherman-scientist relations made during interviews were negative and all respondents alluded to trust issues when discussing poor relations between fishermen and scientists. Survey results also suggested that fishermen have limited trust of scientists, as on average respondents disagreed with the statements *fishermen trust scientists' motives* and *fishermen trust scientists' knowledge.* This suggests that, despite perceptions of good resource health, the fishermen interviewed in this study have low levels of trust toward scientists. This point is further emphasized when analyzing survey results by homeport. Stonington fishermen more strongly disagreed with trust statements than fishermen from Freeport or Harpswell, yet rated the condition of the fishery the highest.

There could be a variety of reasons to explain why fishermen do not seem to trust scientists, even though they rate the resource highly. Likely, fishermen's daily observations of ecosystem conditions on the water are not matching what they are hearing the scientists say. For example, one fisherman noted an abundance of v-notched lobsters in the water, despite scientists claiming a shortage, and expressed strong disbelief towards such claims. His perception of resource health clearly differed from the science that he had heard, and as such led him to distrust scientific data. Many other respondents

repeated this fisherman's views. Perhaps, then, when fishermen perceive the resource as healthy and the science reports otherwise, they are less likely to trust scientists.

5.5 Emergence of relationship quality indicators and connectivity to OPR relationship dimensions

The six relationship quality indicators that emerged throughout this study have varying degrees of connectivity to the relationship dimensions discussed in the organization-public relations (OPR) literature. In particular, trust and commitment are relationship quality indictors that emerged in this thesis that OPR studies also emphasized as significant relation dimensions. In particular, trust and commitment definitions used in this study mirror those in OPR studies.

There are a variety of definitions of satisfaction used in the OPR literature. Some emphasize satisfaction as each party's positive feelings toward one another due to the meeting of their expectations (Huang, 2001), while others emphasize satisfaction of the parties with the relationship because it is beneficial (Stafford and Canary, 1991). Satisfaction in this study tends to lean toward the latter characterization, the contentment of scientists and/or fishermen with the process and outcomes associated with their interactions and relationship, rather than favorability towards one another.

There are also many parallels between this study's relationship quality indicator, influence, and the OPR relationship dimension, control mutuality. Whereas most OPR studies define control mutuality as the degree to which both parties agree on the balance of power in their relationship (Stafford and Cannery, 1991; Hon and Grunig, 1999), this thesis conceptualizes influence as the amount of power or impact a fisherman perceives himself as having in the fisherman-scientist relationship. The distinction between these

two definitions is important, as influence emphasizes an *individual's* (fishermen's) perception of personal power in a situation, whereas control mutuality emphasizes the level of agreement towards the balance of power between *both* parties (fishermen and scientists). This discrepancy highlights fundamental differences between organization-public relations and fisherman-scientist relations, and emphasizes the importance of developing relationship models specific to fisherman-scientist relations.

The OPR dimension "openness" also emerged from the interviews in this study, but is termed "communication" due to slight differences from the literature. As in OPR studies, communication is suggestive of the amount of open, transparent and continual dialogue between parties within a relationship. When defining openness, the OPR literature emphasizes the willingness of both parties to share and consider one another's knowledge and ideas. This study, however, excludes this concept from communication and instead captures it in a separate relationship quality indicator: receptivity.

The distinction between receptivity and communication in this thesis is important, and was readily apparent throughout interviews with fishermen. Communication more often emerged when fishermen were discussing the manner of dialogue and interaction between fishermen and scientists. For instance, differences in fishermen and scientists' language were often a hindrance to communication, as were perceived scientist and fishermen attitudes towards one another. Fishermen in this study also often expressed frustration towards what they perceived as scientist inability to clearly and thoroughly convey information.

The respondents' strong insistence of scientists' unwillingness to consider fishermen knowledge and perspectives led to the emergence of receptivity as a distinct

relationship quality indicator. Unlike communication, receptivity was a common theme that appeared both within and beyond discussions detailing fisherman-scientist interactions and dialogue. In particular, receptivity surfaced while fishermen were discussing scientific research processes, indicating the tensions produced by the divergence of fisherman and scientist knowledge and experience. Notably, while fishermen were eager to express their belief of scientist's lack of receptivity towards their ideas, fishermen also often alluded to their own lack of acceptance and openness to scientist's information and concepts.

5.6 Potential causal relationships of relationship quality indicators

It is important to note that, while distinct in their definitions, the relationship quality indicators that emerged in this study are closely linked to one another. For instance, fishermen who alluded to receptivity and influence positively also tended to be positive when discussing satisfaction. In turn, fishermen with positive satisfaction comments tended to be more positive when discussing commitment. Previous studies also noted a cause and effect relationship when testing relationship dimensions as measures of organizational-public relations. Jo (2002) found a variety of correlations between dimensions, and suggested a causal flow from trust to satisfaction to commitment. Similarly, Morgan and Hunt (1994, p. 24) posited trust as a "major determinant of [relationship] commitment".

Determining which relationship quality indicators affect each other is difficult, and the relationships among indicators are likely not linear. Results from this study can only offer a possible sequence of connections. However, the relative frequency with

which each indicator was mentioned may provide some insight into the causal relationships among these indicators. Similarly, frequency of mentions may also suggest that certain relationship quality indicators have more influence over overall relationship quality.

According to most OPR and natural resource studies, trust seems to be the basis on which relationships are founded; levels of trust between parties have high correlations with the quality of relationships. It is not surprising that trust was the indicator most often mentioned in this study, and that levels of trust may have large effects on other indicators. For instance, the two fishermen who tended to trust scientists' competence also felt scientists were communicative and receptive to their opinions. Similarly, fishermen often referred to scientist's lack of trust in fishermen's competence when discussing their own lack of influence in the relationship.

Based on the results of this study and previous OPR studies, a potential causal model between relationship quality indicators can be developed (Figure 14). It is possible that when levels of trust between fishermen and scientists are higher, there are apt to be higher levels of receptivity and communication. In turn, if fishermen and scientists perceive one another as more communicative and receptive, they are likely to feel they hold more influence in the relationship. Similarly, a relationship with high levels of receptivity, communication and influence will tend to result in satisfaction for those involved, and commitment to a relationship is likely to increase as satisfaction does. Therefore, trust may play an antecedent role to commitment and receptivity, communication, influence and satisfaction are likely mediating variables in this model.

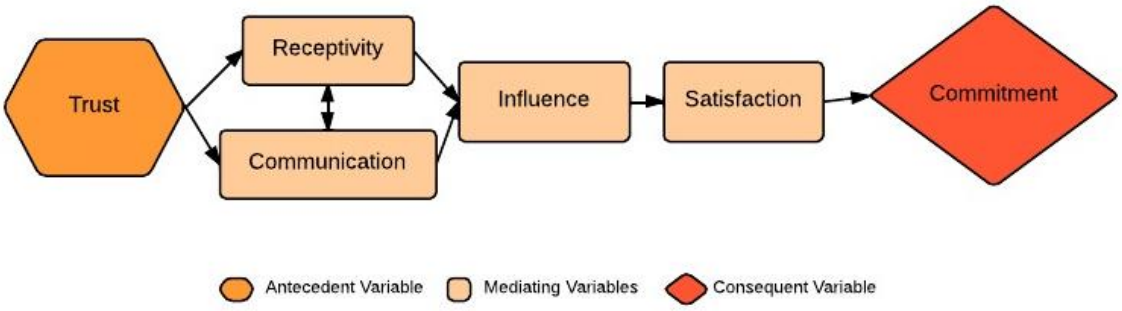

Figure 14. Potential causal model between relationship quality indicators.

5.7 Trust and influencing factors

Spekman (1988, p. 79) describes trust as "the cornerstone of the strategic partnership". Indeed, trust is widely thought to be the main determinant of relationship quality in relationship literature (Spekman, 1988; Morgan and Hunt, 1994; Jo, 2003; Davenport *et al.*, 2007; Glenn *et al.*, 2012;). It is not surprising that trust was mentioned by all respondents of this study, and accounted for the majority of relationship quality indicator comments (53%). Similarly, the emergence of factors influencing trust within this thesis mirrors the proposal of a variety of trust factors within studies on natural resource management and organization-public relationships.

The findings of this study suggest that fishermen's trust of scientists is most dependent on their confidence in and perceptions of scientists' competence. Factors that emerged affecting fishermen's trust of scientists' competence include perceptions of research methods (such as surveying techniques and stock assessment formulas), lack of scientists' experience on the water and discrepancies between scientific results and fishermen's daily observations on the water. Glenn *et al.* (2012) also found that perception of competence was one of the most significant determinants of trust within fisheries scientific communities. Data issues, poor science and communication of results,

insufficient knowledge and experience, and lack of stakeholder involvement and knowledge were cited as the primary reasons for stakeholder uncertainty of the competence of science institutions.

Credibility also emerged in this study as an important factor influencing trust. The majority of credibility comments made by fishermen alluded to the belief that scientists and management entities are too closely related. This was also a theme that occurred in various studies of natural resource context relationships (Glenn *et al.*, 2012; Jacobsen *et al.*, 2012; Dedual *et al.*, 2013). Glenn *et al.* (2012), for instance, cited lack of credibility, and management-bias in particular, as one of the most significant hindrances towards trust. It is reasonable to infer, then, that fishermen are less likely to trust scientists, and science in general, if they link them to management and regulations. The persistence of such views also provides insight into why this study, as well as the prevailing literature, find that fishermen and resource stakeholders are less likely to trust scientists affiliated with government organizations than those affiliated with non-profit organizations and universities (Glenn *et al.*, 2012; Jacobsen *et al.*, 2012; Dedual *et al.*, 2013).

Accountability is the one trust factor that emerged that is exclusive to this study and is not discussed among other relationship studies. As such, it is important to take special note of accountability, despite that it was the least mentioned of all trust factors. In particular, fishermen who discussed accountability expressed strong distrust of scientists due to the belief that there are no repercussions for scientists when their science is in fact wrong. It became clear throughout interviews that the fishermen interviewed feel scientists hold no actual stake in the health of the resource, and as such would not be affected by its health one way or the other. In particular, because scientists' incomes do

not directly depend on the health of fishery resources, it is perceived by fishermen that they are not personally affected when the resource fails, or regulations tighten.

5.8 Improving Relations

Understanding how fishermen and scientists relate to one another, particularly how fishermen perceive such relations, is important for increasing industry participation in scientific processes. This study highlights numerous factors that could affect relations, and identifies areas in which improvements could be made.

The considerable knowledge gap between fishermen and scientists is a theme that continually arose within this study. Observations of relationship context, resource health, fishermen demographics, relationship quality indicators (such as receptivity) and trust factors (most notably competence) all emphasized the role differing knowledge bases plays in poor relationship quality. For instance, fishermen's negative perceptions of scientific methods and research contributed to low levels of trust. Both scientific knowledge and fishermen knowledge (or local ecological knowledge) can be valid and offer useful perspectives. It is important to corroborate both types of knowledge, and ensure that scientists and fishermen clearly communicate and explain their knowledge to each other.

This study also found that more personal interactions with scientists led to more positive perceptions of the relationship, substantiating claims made by Hartley *et al.* (2008) that increased interactions between fishermen and scientists inproved relations. It is important to note, however, that none of the respondents of this study had ever participated in, or been asked to participate in, any form of cooperative research. A few

fishermen offered the opinion that such cooperative efforts only engage a handful of the same large-scale fishermen. This is unfortunate, as almost all fishermen in this study expressed a desire to aid in scientific processes, not only wanting to share their ideas with scientists, but also eager to learn more about the ecosystem on which they depend. Increasing more personal, hands-on interactions, particularly in a research setting, would likely have substantial impact on fisherman-scientist relations. Events such as the Maine Fishermen's Forum could be a useful step in this direction.

5.9 Additional Limitations and Future Research

Due to the lack of prior research conducted on fisherman-scientist relations, this study was conducted using grounded-theory, with the aim of developing a model that could be tested in future research. As such, fishermen's perceptions of fisherman-scientist relations were examined by qualitatively identifying relevant relationship quality indicators, trust factors, and potential factors affecting such perceptions. Future studies could use quantitative methods to further analyze the framework developed in this study. There are a variety of areas that could be further explored, including the causal relationships among relationship quality indicators and the influence of factors such as fishery conditions and fishermen's demographics, operation size and fishing activity on perceptions of relationship quality. While the respondents of this study seem to be representative of the Maine lobstermen population (see Appendix B), it would be beneficial for future studies to engage larger respondent sample sizes. Lastly, future studies could widen the scope of this research by incorporating scientists' perspectives on the relationships between fishermen and scientists.

CHAPTER 6: CONCLUSION

This study highlights fishermen's perspectives on fisherman-scientist relations in Maine, and suggests a myriad of factors that likely affect relationship quality. The results of this study aim to develop a better understanding of the dynamics of fisherman-scientist relations and of fishermen's perspectives in hopes of providing fisheries scientists and managers with suggestions towards fostering better relations with commercial fishermen in Maine.

A few key themes emerged throughout this study that managers and scientists should consider. First, of the relationship quality indicators that emerged, trust was by far the most prevalent. Both this thesis and prevailing literature suggest trust as the largest determinant of relationship quality. As such, the trust factors that emerged in this study should be taken into serious consideration. For instance, fishermen's perceptions of scientist's competence, and their belief of scientist's perceptions of fishermen's competence, emerged again and again throughout interviews. Scientists and managers should heed such results when interacting with fishermen, and make efforts to better convey research methods and results.

Credibility also emerged as an important factor influencing trust. Specifically, all respondents of this study alluded to perceptions of scientist connectivity to management entities. This suggests that fishermen's distrust of science is likely due to a belief that science serves regulatory agendas. Clearly, scientists and managers must work together to some degree, but it is important the two entities appear less associated to maintain credibility in the eyes of the fishermen.

The results of this thesis also suggest that fishermen's perceptions vary depending on homeport. It is likely that factors that depend on geographic locations, such as resource health and demographics, have notable effects on trust and relationship quality. Scientist and managers should consider this when interacting with different groups of fishermen. In particular, scientists and managers should aim to understand how the resource health and market prices within an area affect fishermen attitudes towards science and scientists.

The overall negative attitudes of fishermen towards fisherman-scientist relations in Maine suggest a need for change. The suggestion that personal interactions improve relationship quality should be considered, and efforts towards participatory research, particularly at the state-level, should be broadened. Lastly, it is important to continue research on the themes that emerged throughout this thesis, so as to better understand, and hence improve, the dynamics of fisherman-scientist relations in Maine.

APPENDIX A: INTERVIEW PROTOCOL

Interview Protocol

Opening

Describe the general purpose of the interview and role of the participant. Explain confidentiality and get verbal consent. Discuss risks and benefits. Ask for any questions before beginning.

Demographic Information

Port:
Primary Fishery:
Fisheries involved in:
Years fishing commercially:
Boat size:
Crew size:
Annual landings (lbs):
# of lobster traps:
Age:
Education:

Open-Ended Interview

Prompts are in italics.

1) Have you had any personal experience interacting with scientists? (meetings, public hearings, research etc.) **If yes...**

    a) Can you think back and tell me about any of these interactions? (list all interactions and then focus on relevant interactions one at a time below)

        i) What were the circumstances of this interaction?
            (1) Purpose?
            (2) Type of scientist you were interacting with?
            (3) What was your role? Scientist role?
            (4) What lead to your involvement?
        ii) Tell me about the relations between yourself and the scientist during this process.
            (1) Discuss the levels of communication, trust, respect and power between yourself and scientists in this process.

(a) Examples?
(b) Why do you think it was this way?
(2) Other aspects of the relationships?

iii) Were you satisfied with this experience and its outcomes? How and why?
(1) Was this process beneficial to you? To the scientist(s)? How?
(2) How do you feel your experience affected your relationship with scientists?
(a) No change, positive change, negative change?
(b) Did it alter levels of trust, communication and respect etc? How so?
(c) Did this experience leave you open to future interactions?

If no...

b) Why not?

Survey Questions (asked verbally)

1) The following are general statements about fisherman-scientist relations. Please rate them from Strongly Disagree (1), Disagree (2), neither Agree nor Disagree (3), Agree (4), Strongly Agree (5):

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Fishermen trust scientists' motives	1	2	3	4	5
Scientists trust fishermen motives.	1	2	3	4	5
Fishermen trust scientists' knowledge	1	2	3	4	5
Scientists trust fishermen knowledge	1	2	3	4	5
Fishermen respect scientists	1	2	3	4	5
Scientists respect fishermen	1	2	3	4	5
Communication between fishermen and scientists is open and transparent	1	2	3	4	5

2) Please complete the following statements, from Much Worse (1), Worse (2), neither Worse nor Better (3), Better (4), Much Better (5).

Statement	Much worse	Worse	Neither worse nor better	Better	Much better
Relations between fishermen and scientists are getting:	1	2	3	4	5
Communication between scientists and fishermen is getting:	1	2	3	4	5
Trusts between fishermen and scientists is getting:	1	2	3	4	5
Respect between fishermen and scientists is getting:	1	2	3	4	5

3) Please complete the following statements about the conditions of your fishery, from Very Poor (1), Poor (2), Average (3), Good (4), Excellent (5)

Statement	Very poor	Poor	Average	Good	Excellent
The health of the resource is:	1	2	3	4	5
Recent market prices for the resource are:	1	2	3	4	5
In my opinion, the overall condition of the fishery is:	1	2	3	4	5

APPENDIX B: COMPARISON OF STUDY RESPONDENTS TO MAURICE *et al.* (2006) RESPONDENTS

Table B1. Comparison of study respondents' demographics to Maurice *et al.* (2006) respondents'.

	Education Attainment			Average Age
	High School	Some College	BA or Above	
Maurice *et al.* (2006) Respondents (n=695)	46%	22%	15%	50
Thesis Respondents (n=18)	56%	22%	22%	52

Table B2. Comparison of study respondents' operation size and fishing activity to Maurice *et al.* (2006) respondents'.

	Vessel Length	Average Crew Size	Average Landings	Average Traps	Avg Years Fishing	% with other non-lobster commercial fishing Permits
Maurice *et al.* (2006) Respondents (n=695)	31ft	2	24,000lbs	556	29	35%
Thesis Respondents (n=18)	34ft	1	47,000lbs	650	28	56%

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