Draft Report: Costs and Earnings Survey, Inshore and Onshore Fishing Sector, SWNB

Report to the Fundy North Fishermen's Association
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Introduction

Over ten years ago, the Social Sciences and Humanities Research Council of Canada (SSHRC) established innovative Community-University Research Alliance (CURA) funding that combines both local and academic knowledge to address social, cultural and economic issues confronting Canadian communities. The focus of this funding is capacity building, sharing of information and knowledge, and development of strategies for decision-making and for the enrichment of academic curricula.

The Coastal CURA is a five-year project that takes a regional focus on livelihood problems facing coastal communities in the Canadian Maritimes. This CURA is an alliance of First Nations communities, fishermen's associations, civil society, government, non-governmental organizations, and university participants from the Maritime Provinces (New Brunswick, Nova Scotia and Prince Edward Island). Specific goals for Coastal CURA include: examining the current effectiveness of coastal resource governance; increasing community capacity to participate in the integrated management of the coast; establishing a maritime network for community-level governance; and contributing to coastal and oceans research innovation and knowledge generation (see www.coastalcura.ca).

This paper reports on one project undertaken as part of the Coastal CURA research agenda. It focuses on coastal Southwest New Brunswick (SWNB), including coastal areas of Saint John and Charlotte Counties (see Map 1). According to the 2006 census data of Statistics Canada, Saint John County has a population of 74,621, of which 10,622 lives in small coastal towns. Charlotte County, with no large city center, has a population of 26,898[1]. Much of this population base outside the city of Saint John lives in small coastal towns and villages. The project examined the contribution of the inshore fishing sector (with boats under 45 feet in length) to the economy of such coastal communities.

[1] http://www12.statcan.ca/english/census06/data/popdwell/Table.cfm?T=703&PR=13&S=0&O=A&RPP=25

SWNB is an area that is undergoing rapid expansion with numerous competing users of the coastal zone. Traditional users such as the capture fishery, tourism, shipping and transport are experiencing the difficulties of making room for new entrants, including aquaculture, industrial and petrochemical development, and tidal power. Management regimes for coastal areas are not keeping pace with such new developments, or with the management challenges they generate. The objective of this project was to provide the information needed to further integrated management of coastal activities, to facilitate better management and planning, and to better weight the costs and benefits of competing claims on coastal resources.

The project used both quantitative and qualitative data gathering methods, including a questionnaire that collected information from license holders on their costs and earnings, and a set of semi-structured interviews that explored the experiences of the onshore harvesters of dulse, periwinkles, clams, and gaspereau. Project partners were drawn from the University of New Brunswick, Sir Wilfred Grenville College of Memorial University Newfoundland, and Fundy North Fishermen's Association. Two other organizations, the Fundy Weir Fishermen's Association, and Eastern Charlotte Waterways Incorporated (a non-profit community organization) also assisted with the study. This paper begins with a brief discussion of the management challenges in SWNB, turns next to the need for the project, describes the methodology utilized, and then reports on the findings. We conclude with a short discussion section that assesses the impact of the inshore sector on the economy of coastal communities.

Map 1: The Province of New Brunswick

Integrated Management In SWNB

In the seventeen years since the Rio Declaration (1992), coastal nations around the globe have adopted policy utilizing the language of *integrated management* (IM)[2] (Olsen 2003; Christie 2005, Christie et al. 2005, Stojanovic 2004). IM advocates a multi-disciplinary approach to address the often conflicting requirements of maintaining the sustainability of the biophysical environment and of the livelihoods of those who depend on that environment (Olsen 2003). It promotes a planning collaboration that is adaptive and ongoing in order to address social, economic, institutional, environmental and legal interests of multiple stakeholders and of the resources being managed (Christie 2005). The Coastal CURA research has examined the Canadian process of building IM for coastal zones with a particular focus on the Canadian Maritimes (see Kearney et. al. 2007). given the literature on deliberative democratic theory, has particularly focused on "the factors that fuel public discussion and debate and how those deliberations are both enhanced and or inhibited" (Parkins and Mitchell 2005: 537).

The area of coastal SWNB that lies along the Bay of Fundy is a complex marine environment, with unique tidal waters and estuaries hosting several important commercial species (lobster, scallop, herring, groundfish) as well as species that attract tourism (right whales, migatory birds). It is currently viewed as a potential economic growth area in a province that has been struggling economically. Historically, fisheries resources have provided a significant contribution to the local economy; the fisheries sector has often been the sole or one of the few contributors, followed closely by tourism. The area still relies to a large extent on the fishery, with approximately 325 lobster licenses, 200 ground fishing licenses and 217 weir licenses currently held by local fishermen (Southwest New Brunswick Marine Resources Planning Board 2008). There are also 97 aquaculture site locations within the SWNB portion of the Bay of Fundy, including licenses for finfish species (Atlantic salmon, cod, halibut) as well as bivalves (mussels) and aquatic plants (Anderson 2007). In addition, 10 tourism operations (e.g. whale watching, boating, sea kayaking) contribute to the economy of SWNB coastal communities, as does significant coastal gentrification, particularly in the Fundy Islands.

Many more recent users of the SWNB marine space also exist. Shipping traffic into the international port of Saint John is on the rise. The potential development of a second oil refinery

[2] Although the terms Integrated Coastal Management (ICM), or Integrated Coastal Zone Management (ICZM) are widely used, we conform to the current practice in Canadian legislation and policies of using Integrated Management (IM).

in that city to address the eastern Canadian and US demand for an additional 150,000 to 300,000 barrels per day (Irving Oil 2008) will add to shipping complexity. A liquid natural gas (LNG) plant has also just been completed in Saint John Harbour. The development of a provincial "energy hub" is proposed for the area, linking wind and tidal installations to the more traditional petrochemical and nuclear sources. The management and coordination of these burgeoning activities has both stretched government capacity and challenged traditional users.

Need for the project

Increasingly, civil society organizations or industry groups underwrite the public consultation vital to the integrated management of Canada's coastal zone. Fundy North Fishermen's Association (FNFA) is a good example of this tendency. The organization was established in the mid 1980's, and is a not-for-profit fishermen's organization that represents license holders (e.g. lobster, scallop, eel and gasperau) as well as crew members. The association has approximately 75 members[3]. FNFA participates as a stakeholder advocate regarding all matters affecting the capture fishery from Saint John to St. Stephen, including Deer Island, but excluding Grand Manan and Campobello islands (see Map 1). This organization is called upon to represent the interests of the inshore sector in management and planning for the coastal zone. They serve on Department of Fisheries and Oceans (DFO) stock management committees for all commercial stock utilized by their membership, organize *ad hoc* committees to address marine traffic lanes and post-9-11 security issues in Saint John harbour, collaborate on environmental impact assessments (EIAs) and on "harmful alteration, disruption or destruction" (HADD) remediation, participate in academic research, including the Coastal CURA, cooperate in development of school curriculum on coastal issues, and provide stakeholder input on consultation issues ranging from LNG proposals to tidal power to aquaculture site licensing.

However, FNFA receives no support for their involvement in such activities, and do not have easy access to the information needed to make their participation meaningful. We argue that any integrated management approach requires a full spectrum of information and knowledge be gathered and disseminated to those involved in planning and in resource use, in order to

[3] Some regional fishermen choose to remain independent and do not join fishing organizations, although they benefit from negotiations and agreements between FNFA and DFO/provincial regulators. Fishermen with multi-species licenses may also hold membership with other organizations such as the Fundy Weir Fishermen's Association.

provide common ground for discussion and to ensure informed decisions and choices are made. Before FNFA could meaningfully participate in various stakeholder consultations, they recognized a need to identify current information and to address existing gaps in knowledge. One information gap they identified involved the relative contributions of the many competing industries to the healthy economy of coastal communities. How many local jobs does the inshore fisheries sector create and how much of the wealth generated stays in coastal communities? Having the answer to such questions available through mechanisms that all find easy to consult will empower stakeholders to enter discussions as informed participants. This project addressed this lack of information through a costs and earnings study on the inshore fishing sector, as well as some research into the relatively invisible "onshore" harvesting of clam, periwinkle, dulse and other coastal resources. It provides information useful to government, the inshore sector and other stakeholders involved in the management and planning of coastal resource use.

Methodology

The project involved a two-pronged approach to data gathering, both of which are described in this section. First, as a great deal of small scale fishing activity in the region operates "below the radar" of government statistical information systems (see also Whitmarsh et al. 2000, Bradshaw et al. 2000), we wanted to better understand who was participating in onshore harvesting and what contribution such activities were making to livelihoods in coastal communities. Qualitative information on these activities was obtained through twenty-four semi-structured interviews. Second, as government statistics are out of date on the costs and earnings of the inshore sector, and as these statistics are aggregated to the regional level, we wanted to better understand the local community level of contribution of the inshore sector. This quantitative information was sought through a mail-out questionnaire.

Onshore Harvesters Semi-Structured Interviews

On-shore harvesters work along coastal zones and rely on species such as clam, periwinkle, dulse, and rockweed, as well as river and lake species such as eel, gaspereau, and shad. Some onshore harvesters are licensed by the DFO (clam, gaspereau, eel and shad), while others were not (periwinkle, dulse). As there are no good statistics available on the total population of such onshore harvesters, or of their economic contribution to coastal communities, our objective in the qualitative component of our project was to get a preliminary assessment of how important these

activities are. What numbers are involved? What is their demographic profile? What do they perceive as risks to their industry?

A total of 24 semi-structured interviews were conducted in the coastal communities of southwest New Brunswick during the summer of 2008. Several different types of respondents were sought using snowball sampling. The main focus was harvesters of onshore species. The local processors in the region for these species were also contacted for interviews. One processor operates a holding operation only (local clams were purchased and shipped to northern New Brunswick for processing) and another had recently exited the industry. When individuals from some harvesting sectors proved difficult to track down (as with periwinkle harvesters), persons who were identified as knowledgeable about their community were also interviewed about the onshore sector of their local economy. Most of these key informants are active licensed fishermen from the inshore sector.

For onshore harvesters, interview questions were divided into four general categories: their personal background, fishing activities and household livelihood, sales and consumption, and numbers involved in the industry. Processors were asked about their background, their processing activities (including relations with the regulators), pricing and market information, and numbers in the industry. Key informants were asked background information about their community, about fishing activities in their community, sales and consumption patterns, and numbers in the industry. All were asked about the health of the stocks the onshore harvesters relied upon, as well as factors affecting stock health. Of those interviewed, ten were harvesters (six clammers and/or periwinklers, three gaspereau/shad and/or eels, one dulse/periwinkles); three were processors (one with an inactive license) and eleven were key informants. Some respondents fit into multiple categories, as was the case for one processor who was also a harvester, and two key informants who were occasional harvesters of onshore species.

The responses from each interview question were transcribed into a data record sheet. Data from these record sheets were then entered into a master spreadsheet so that responses from each category could be analyzed as a unit. A preliminary analysis of the data was prepared and circulated to a few key individuals in the region who work with onshore harvesters for feedback and critical comment.

Questionnaire Design, Delivery and Response Rate

The second data gathering approach involved a ten page mail-out costs and earnings questionnaire that focused primarily on quantitative data from the under 45 foot (14 meters) boat sector of the inshore fishery. The questionnaire began with an introduction page, explaining the purpose of the study and methods that would be taken to ensure confidentiality. This page also provided contact information for those conducting the study. This was followed by ten pages of questions, divided into several sections covering the following topic areas: threats to fishing livelihoods, threats to coastal communities, information on home port and residence, vessel characteristics and crew employment, a summary of 2007 licensing and landings, marketing locations, 2007 expenditures and a final section on background information on the respondent. In addition, the survey left space for comments on other potential threats to the industry, on marketing concerns, and for any other remarks. It also included a help-line phone number on every page for anyone who had trouble filling out any section of the questionnaire.

This questionnaire was developed in collaboration with FNFA, and a first draft of the questionnaire was discussed with a small focus group of fishermen before being amended and submitted through the ethical review process at the University of New Brunswick. Once the final survey was developed, the Fundy Weir Fishermen's Association was asked if they would also endorse the survey with their members (weir herring fishermen in the LFA 36 area) who are among the license holders in SWNB. They supported the survey and helped to advertise it among their membership. The costs and earnings survey was advertised on a local radio program and talk mail announcements from both fishing organizations also explained the purpose of the survey.

Fundy North Fishermen's Association staff prepared the questionnaires mailout and included a self-addressed and stamped envelope with which to return the completed forms. The Department of Fisheries and Oceans prepared a set of address labels and facilitated mailing to all license holders. After the initial mail out, several reminders were distributed both in the form of additional talk mail announcements and through a complete mailing of reminder post cards.

A total of 176 questionnaires were distributed to holders of inshore commercial fishing licenses in Lobster Fishing Area 37, which represents the main fishing area for such license holders in SWNB. This is the total population of all commercial license holders in the under 45 foot boat sector. The response rate was 56 respondents or 31.8%. However, not all questions

were completed in all questionnaires, so the response rates on some questions vary. The responses were mailed to the Department of Anthropology at the University of New Brunswick, where the data was coded and entered into an Excel spreadsheet.

{What do we want to say about analysis of the data….???}

Results

Onshore Harvester Interviews

Background of Respondents:

With the exception of two harvesters, all respondents came from families with a history of involvement in the fisheries, and all but two respondents had other fishers in their households. Most harvesters had been involved in fishing multiple species in the past, including lobster, groundfish, scallops, and sea urchin. Many fished with other family members with core licenses (sons, fathers, uncles). A few continued to serve as boat crew in addition to their independent harvesting activities. The oldest informant was 73 years of age; the youngest was 37. Most respondents fell between 55-65 years of age. Most respondents were male (21 of 24). This is unfortunate, since it is apparent that at least the periwinkle industry has significant numbers of female harvesters involved. All respondents were residents of small coastal communities between Saint John and St. Andrews (including Campobello and Deer Islands), with the exception of two gaspereau/eel fishermen who resided in the Grand Lakes and Ripples areas.

The majority of onshore harvesters had multiple sources of income, many relying for part of the year on Employment Insurance. When asked to choose between characterizing their household incomes as “doing well”, “losing ground” or “in difficulty”, 13 out of 24 harvesters characterized their household income levels as “doing well”. However, a few mentioned that they had had to increase the intensity of their harvesting activities in order to maintain income levels, and three others reported that due to shellfish beach closures their incomes had significantly declined in the current year.

Fishing Activities:

All respondents reported a surprising number of people in their communities who made use of the various onshore species (see Table 1). Most respondents gave similar counts for community numbers in each species – generally clam harvesters represented the greatest number in any community and also the most communities with people in the industry. However, many reported

that the numbers in the clam industry were dropping. Periwinkle harvesting is said to be on the increase, with many communities having upwards of 30 people involved. Gaspereau and eel had the least number involved in general (6 to 8 individuals), although Saint John was reported to have upwards of 100 license holders for gaspereau. In a few communities, specialized seaweed harvesting (rockweed) provided steady employment in both harvesting and processing.

The pattern of harvesting activity was variable according to species. Periwinkle harvesting can be done all year but is most intensive during the winter; clams are harvested in two seasons to avoid the summer months when red tide (and thus the danger of paralytic shellfish poisoning) is more common; gaspereau is harvested in the spring, shad in May and June, and eels are harvested in the summer. Many harvesters of clams or dulse will also harvest periwinkles, as there is no license required and periwinkles can be harvested when clam flats are closed due to red tide or pollution. Clam and periwinkle harvesters cover a wider geographical range than other harvesters, perhaps as a result of the relative scarcity of beaches that are open for harvest at any one time. Most harvesters do not consume significant amounts of their own product; instead, the catch is sold to local wholesalers. Gaspereau harvesters in the Saint John Harbour area tend to use their own catch as bait for lobster fishing, although any surplus may be sold. The gaspereau fishery on the river system tends to be a much larger fishery and the catch is nearly all sold.

Numbers in the Industry

Respondents were asked to comment on the numbers in their particular industry for their community, and were also asked questions about the role of harvester organizations and cooperatives. Clam harvesters generally noted that their numbers were down. Many attributed this to the fact that they were losing areas where they were allowed to dig. A number of clam harvesters noted that the recently formed clam cooperative could assist them with this problem. The cooperative was formed not as a marketing strategy, but rather as a mechanism to facilitate the water and meat testing that must be done on a regular basis to keep information accurate on shellfish conditions on specific beaches[4]. The cooperative charges a small fee for water and meat testing and facilitates more regular testing than is currently available in other jurisdictions (as on

[4] The regional ACAP, Eastern Charlotte Waterways Inc., has been assisting clam harvester associations to organize the cooperative (see http://www.ecwinc.org/main.htm).

the Nova Scotia side of the Bay of Fundy). Clam harvesters are also hopeful that this cooperative will get access to beaches for research into stock enhancement and habitat reconstruction. Processors reported being largely supportive of the cooperative, as it facilitates their supply of clams. However, they have some concerns that the cooperative should not be allowed to unilaterally restrict harvester access to beaches.

Periwinkle harvesters, on the other hand, are uniformly reported to be increasing in all those communities for which we had information. Many attributed this to the fact that periwinkle harvesting is not licensed, so individuals can enter or exit that fishery very easily. In some communities, a high proportion of periwinkle harvesters are women and children. It would be interesting to know to what extent this activity is supporting single parent households.
In terms of recruitment to a number of these industries, many respondents reported that young people are leaving the fishing communities because they find it too difficult to enter the fishery or are unwilling to undertake the difficulties involved in the lifestyle.

Gaspereau and eel harvesters, for example, report that their numbers are declining, and current license holders may not be able to sell their licenses when they retire as very few young people are showing an interest in the fishery. One reason for this is that there is not enough profit in the business to support the cost of buying into the fishery. Older fishermen who have paid off their licenses can earn a living, but new entry costs would undercut any profits. Also, a change in regulations has reduced the number of gaspereau sets[5] allowed per license, which will affect the pay off when retiring fishermen sell their licenses.

Estimated numbers in each industry and for each community are listed in Table 1 below. According to most respondents, these numbers are only rough estimates.

	Shad	**Eels**	**Gaspereau**	**Clams**	**Periwinkles**	**Dulse**	**Rockweed**
Saint John area	20	15-20	30				
Black River		5-6					
Dipper Harbour				20-25	20-30	30	

[5] Gaspereau are harvested by gill, trap, and dip nets depending upon the river and location within the river system, e.g., gill net in the river mouth, dip net in the lower river, and trap net in lake areas. Sets refer to gill net assemblies – according to informants, currently 12 sets are allowed to a license.

L'Etang			3-4		8-10		
Pennfield				100	40-50	40-50	100
Maces Bay					8	8	
Campobello				16-20	12-20		
Deer Island				3-4	15-18		8
Grand Lake		6	12				
Point Lepreau				15-18			
Bocabec				40-50			
Ripples			8				

Table 1: Estimated numbers in shore based harvesting, SWNB

Stock Health

There was some discrepancy in answers with respect to the health of the various stocks involved. Most respondents indicated that stocks were under stress, but two respondents felt that the species they relied on tended to go through cycles, with a few stocks currently improving or about the same (gaspereau, shad, periwinkles, dulse), and others in decline (clams, eels). Five harvesters noted that the average size of individual clams, periwinkles and eels were smaller even though some stocks in specific areas appeared healthy in numbers. When asked what factors were affecting the stocks, most respondents expressed concern about specific issues. For example, while clam numbers were steady in some areas, harvesters could not make use of those stocks due to fecal contamination or paralytic shellfish poisoning. Some harvesters reported having contacted various government departments to address land-based pollution on beaches (aging or poorly constructed septic systems, other sewage or discharge problems) with very little success. A number of respondents attributed this problem to poor government regulation. Eight respondents also mentioned various forms of pollution from aquaculture operations as a concern. Several respondents noted that beaches were littered with old cages, feed bags and other garbage from the salmon aquaculture industry. Some respondents reported that eel grass was taking over and driving some species out of prime habitat; they felt that this was related to deteriorating water quality linked in turn to aquaculture feed. Rockweed harvesting was also said to reduce nursery habitat for periwinkles and clams.

A number of harvesters were concerned about over-harvesting. Eel harvesters noted that licensing the harvesting of immature eels for raising in pens was impacting the stock; two clam harvesters argued that lack of effective monitoring of recreational diggers allowed commercial

harvesters to mask their activities; three clam harvesters mentioned that dock side monitoring didn't seem to be effective (this was also a concern for processors).

On the other hand, processors reported that harvester numbers were severely down compared to former years. One processor reported that in the past she could count on over 123 clam harvesters, whereas today she relies on less than 6. Nevertheless, this same processor also expressed concern about over-harvesting of specific beaches.

Relationship with Regulators

Questions were asked about the relationship between harvesters, processors and the federal regulatory agencies involved in fisheries regulation and food inspection and safety, including the Department of Fisheries and Oceans, the Canadian Food Inspection Agency and Environment Canada. All respondents expressed frustration with these agencies. Some respondents reported that any complaints about these agencies or to these agencies, however, could result in "repercussions" such as harassment masked as monitoring. Other respondents noted that "they have their job to do and we get along fine", but would then go on to comment that regulations are not effective, there is little monitoring or enforcement, and in particular, these agencies act without regard for fairness and transparency. A few respondents felt that the aquaculture industry received far too much support and assistance from the government, while the capture fishery sectors languished without any effective support. Other respondents had very specific concerns about fish habitat and the "destructive practices" of the regulators. The management of the Mactaquac Dam was mentioned as a site of concern, as was the lack of "point of source" assessment of pollutants on shellfish harvesting beaches.

Sales and Consumption

The majority of harvesters reported marketing their product to local processors (one gaspereau fishermen reported selling into PEI). For clam harvesters, the increasing likelihood that beaches are contaminated and thus that clams must be depurated before marketing appears to have a mixed impact. Depuration does allow them to continue harvesting and earning an income, but they cannot shuck the meats when depuration is required, and thus they earn less for each bushel of clams they harvest (shucking is done by plant workers after the clams have gone through the depuration process).

Local processors report that their main markets are in the United States (especially for clams) and Europe (for eels and periwinkles). Lesser markets are in the Maritime Provinces, or

in Toronto. Both processors and harvesters report that prices have been falling for clams, and holding steady or slightly improving for periwinkles. However, many also note that the rise in the Canadian dollar and inflation from rising fuel prices had squeezed their profit margin in the past year. Prices for gaspereau and shad have remained steady. Some prices go through seasonal adjustments; in the winter, clam prices go down, but periwinkle prices go up. Eel harvesters reported that their prices are being driven down by competition from growers in the Far East who buy the immature eels from Canada and grow them out for market. Some harvesters are concerned by the reduction of buyers and local processors. This makes it more difficult to find competitive pricing. Very few harvesters reported consuming the species that they harvested with any regularity, many cited regulations that prohibit this. Most reported that less than five percent of their harvest was consumed in their own or related households. Gaspereau fishermen may be the exception, as some use the catch as bait in their own lobster fishery.

Relative Importance of Onshore Harvesting

Several questions were asked about the relative importance of these onshore harvesting activities in coastal community economies. Most respondents felt that regulators did not recognize the importance of these activities. Some harvesters reported that even in "elite" (i.e. core fishermen) households, any downturn in their earnings might result in their falling back on some level of supplementary harvesting of onshore species. Other harvesters noted that these species allow young people to earn money for school or other expenses, and allow semi-retired fishermen to earn extra income. Furthermore, the processing plants often hire many people in the community (the processor who had recently ceased operation had formerly hired 45 employees).

Some respondents talked of the cultural importance of these activities. Access to these species taught the youth in the community a good work ethic – if they needed money for school or an activity, they could earn it through their own efforts. Several respondents pointed out that if their communities "were not fishing communities, then they were nothing at all". Young people were moving away and former fishing villages were becoming "retirement communities". Several respondents mentioned that most people in their communities had lost the right to fish and that this was as a key problem in community survival.

Inshore Sector Questionnaire Results

General Demographics

The results from the questionnaire support other findings that fishermen in the inshore sector (boats under 45 feet) are an aging population (see Figure 1). Nevertheless, a surprising number of respondents intend to remain in the fishery for the next 10 to 20 years (see Figure 2). Given the age distribution, many of the respondents had twenty or more years experience in the industry (see Figure 3). Over 83% (46 of 55) of respondents were raised in a fishing family and 42 of 55 (76.4%) have other family members that fish commercially. Among the 42 respondents, the most common relative in the industry was a son (n =15), followed by father (n = 10) and brother (n = 9). When asked about succession, 20 of 45 fishermen indicated that one of their relatives would take over their fishing operation when the respondent retires; slightly more (25 respondents) indicated that one of their relatives would not take over (10 respondents did not answer the question).

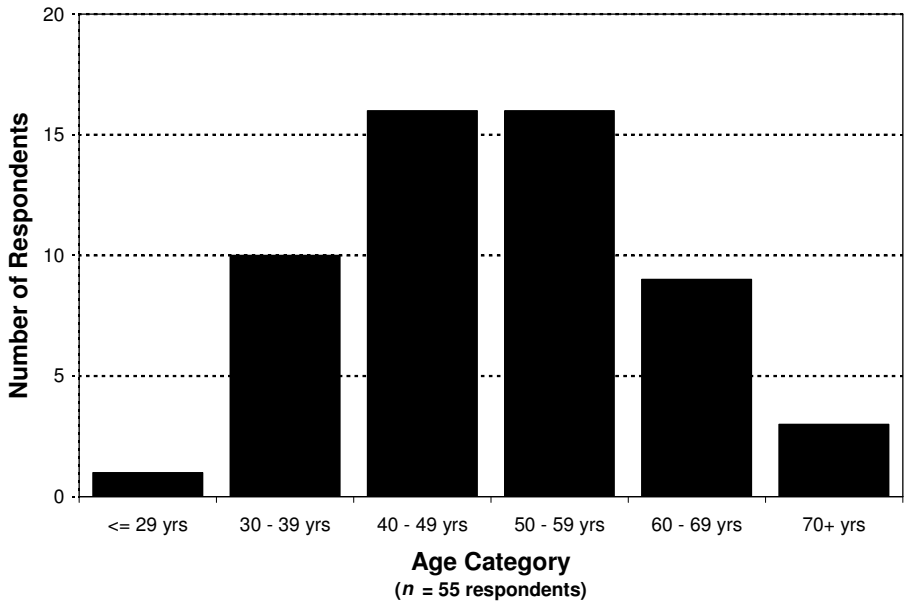

Figure 1

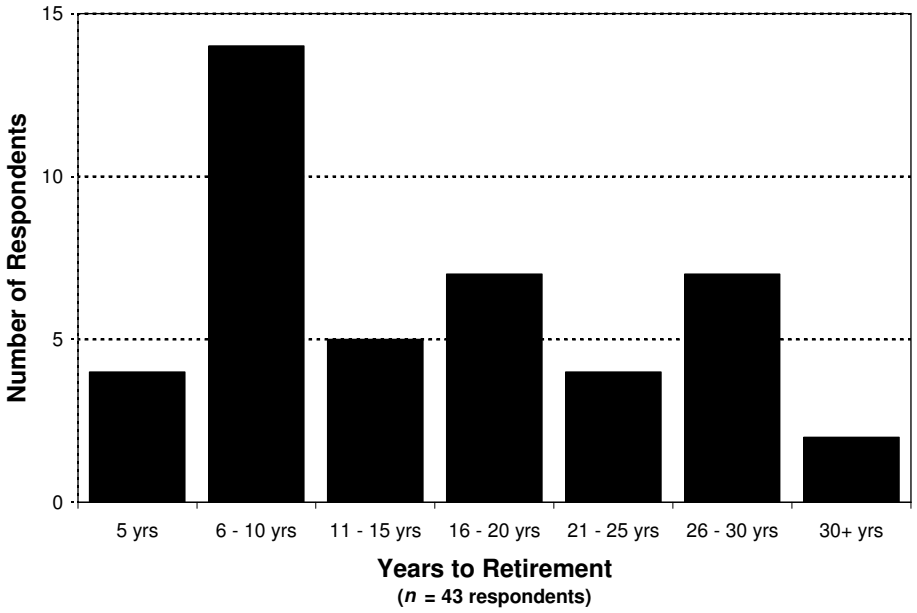

Figure 2

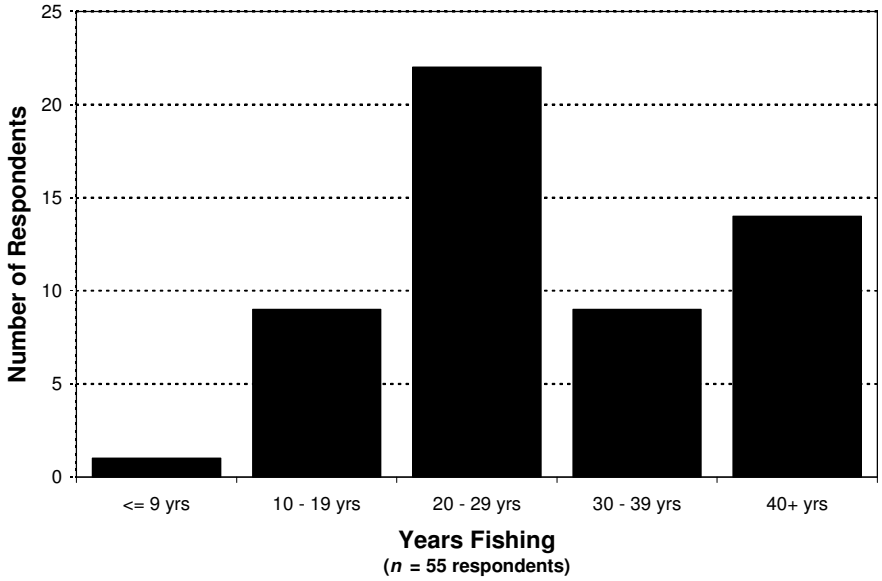

Figure 3

Household Income

Of 54 fishermen answering the question, 48 (87.3%) indicated that fishing was the most important source of revenue for their family. A breakdown of household dependency on fishing income is shown in Figure 4. Of 54 fishermen answering the question, 24 (43.6%) indicated that no other members of their household earned wages from non-fishing jobs. Of the 30 respondents

who did indicate other household members earned wages from non-fishing jobs, wives were by far the most likely to be working outside the fishery (26 of 54, or 47.3% of households).

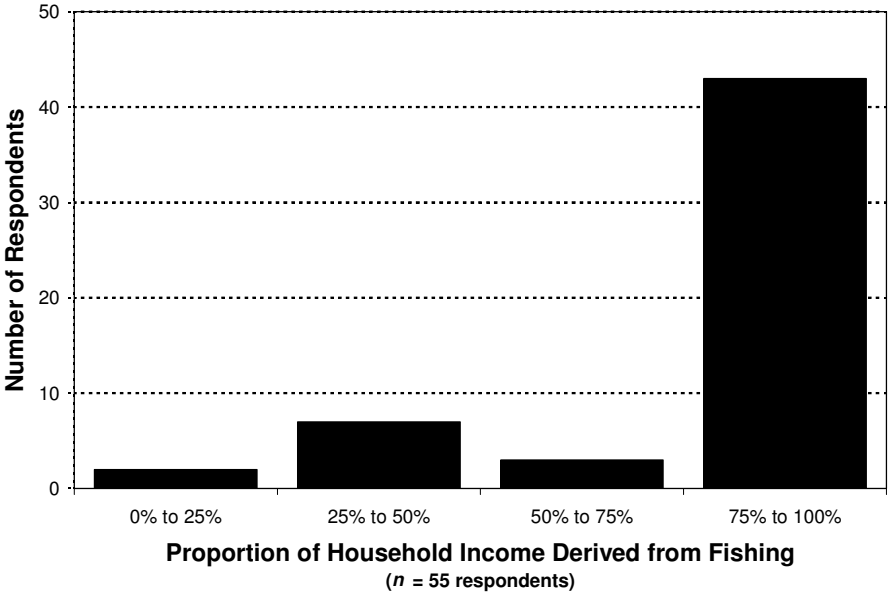

Figure 4

Threat Perceptions

Fishing Livelihoods

Figure 5 shows the results of the first threat perception question, which focused on potential threats to fishing livelihoods. The exact wording of the question was: "Do you think the following factors pose a threat to your ability to **earn a livelihood from fishing** in the Bay of Fundy?" The potential threats included in this question included:

- DFO fishery management regulations
- Declining fish stocks
- Difficulties in finding crew and labour
- Expansion of aquaculture in the Bay of Fundy
- Too few seafood buyers
- Low market prices
- Access to wharves
- Aging workforce
- Operational regulations (e.g., Transport)
- Challenges in selling enterprise at retirement
- Industrial developments

- Inflation and the rising costs of fishing

In Figure 5, the potential threats are sorted based on the number of survey respondents classifying the threat as 'very important'. Threats seen as being either 'medium' or 'quite high' importance are shown to the right of the centre line, while those threats seen as being 'quite low' importance or 'not at all' important are shown to the left of the center line. The number of 'no opinion' and non-responses is shown to the right of the chart.

Most fishermen saw inflation and the rising costs of fishing as a very important threat. Moving down the list, one can see that there is some divergence in opinion on some threats. For example, about half of fishermen see access to wharves as being relatively unimportant. It was the single issue with the highest number of 'quite low' or 'not at all' ratings. However, note that this issue garners a higher number of 'very high' importance ratings than the aging workforce issue (which has far fewer 'not at all' important ratings and a higher number of 'medium' and 'quite high' ratings).

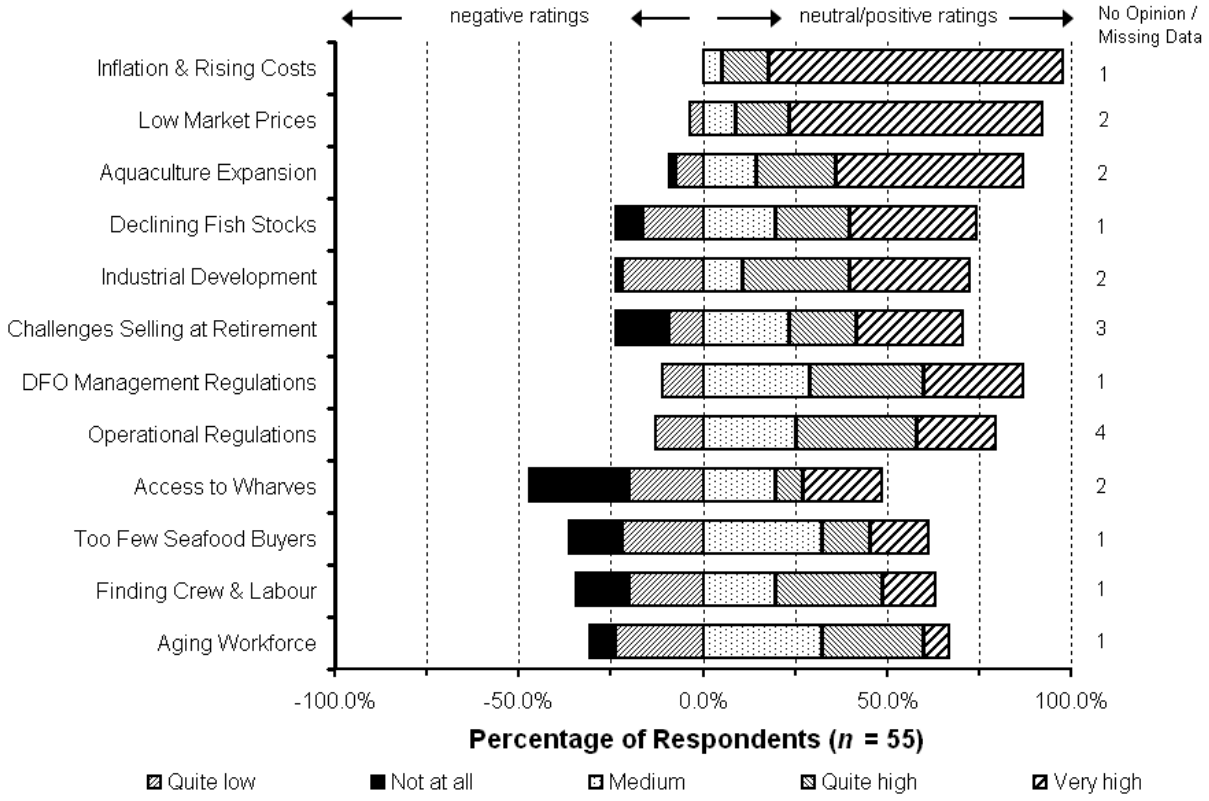

Figure 5 – Perceived importance of various potential threats to fishing livelihoods

Fishing Communities

Figure 6 shows the results of the second threat perception question, which focused on potential threats to fishing communities. The wording of the question was: "Do you think the following factors pose a threat to the overall health and viability of **fishing communities** in the Bay of Fundy?" The emphasis in this question was on threats to the overall fishing community rather than personal livelihood. A number of the same factors from the first question were retained and some additional factors added. They included:

- Government regulation
- Declining fish stocks
- Industrial development
- Difficulties in finding crew and labour
- Expansion of aquaculture in the Bay of Fundy
- Too few seafood buyers
- Low market prices
- Rising costs of coastal land
- Access to wharves
- Lack of regulation on non-fishing industries
- Lack of access to shore/beaches
- People leaving the regions
- Inflation and the rising costs of fishing

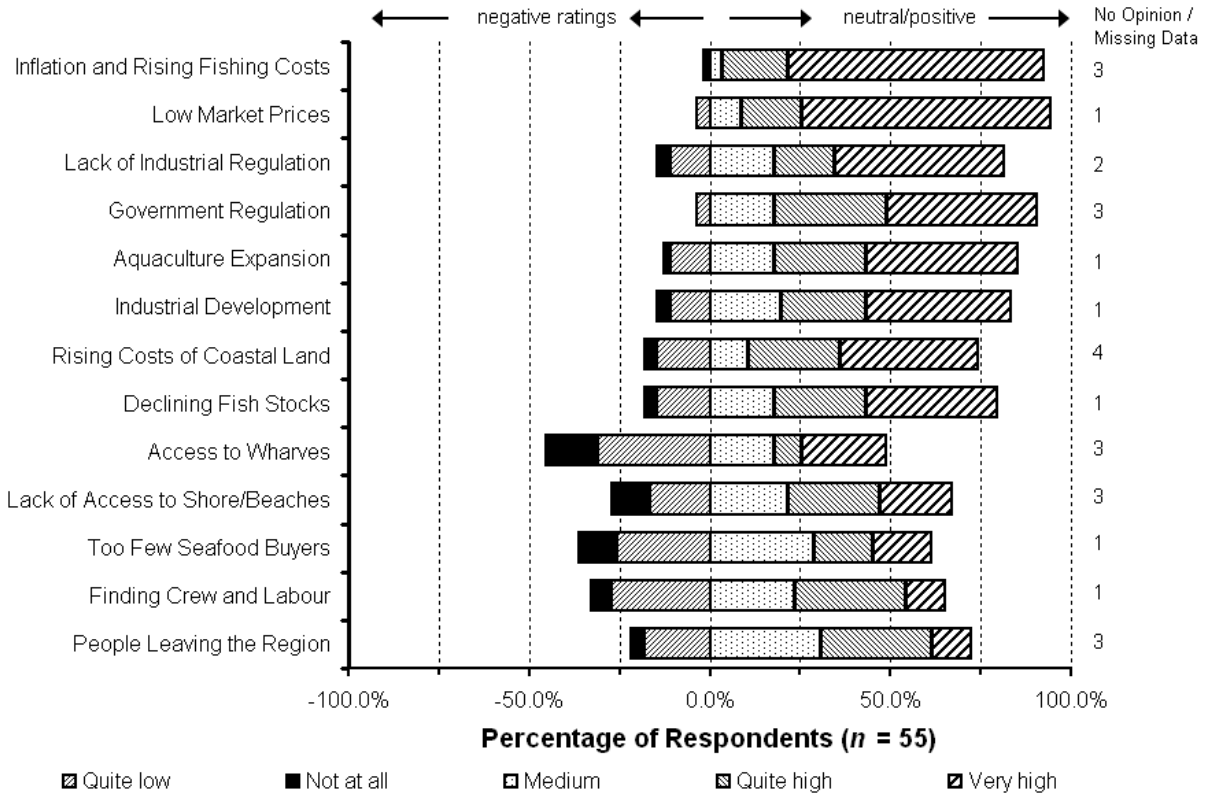

Figure 6 – Perceived importance of various potential threats to fishing communities

Again, inflation and rising fishing costs were seen as the most serious threat to the viability of rural fishing communities (in addition to being the primary threat to personal capacity to earn a livelihood from fishing). A group of non-fishing factors – regulatory factors, aquaculture expansion, industrial development and land prices – were viewed relatively similarly as important threats. Wharf access was again seen as either very important or of low importance.

Latent Class Cluster Analysis

While providing relatively simple insights into perceived threats, the responses to ratings questions can provide additional information about how particular groups of people perceive threats in similar or different ways.

In this section, we use a technique known as latent class (LC) cluster analysis to determine which threat ratings really define overall threat perceptions and to assess whether those general perceptions vary amongst fishermen with different demographic characteristics (e.g., age, experience, etc…).

The LC clustering process consists of several steps:

1. Determine which, if any, of the threat factors provide redundant information and can be eliminated from the analysis. Each survey respondent provided ratings for 12 potential livelihood threats and 13 potential community threats. This is likely more information than really needed to identify core threat perceptions. To identify factors that can be dropped from the threat perception model, we examine the number of significant bivariate residuals (BVRs) in each cluster analysis, starting with an analysis with all factors included. A significant BVR indicates that there are interactions between two threat factors. We tally total significant BVRs for each threat factor and sequentially drop those factors from the analysis with the highest number of significant BVRs (i.e., the factors with the most redundancy). When two or more factors had the same number of significant BVRs, we eliminated the one with the largest BVR first.
2. Once there were no more significant BVRs, we then examined whether the fishermen respondents could be cleaved into two or more different sub-segments that varied statistically in their threat perceptions. We did this using latent class analysis. Latent means underlying or unobserved; LC cluster analysis looks at the response patterns of the fishermen and determines if there are significant differences between some sub-segments of the sample. Usually we would use a series of statistical diagnostic tests to identify the single best breakdown into sub-segments. Given the very small sample size (n=54 completed surveys), we had to relax our clustering criteria somewhat. We first identified those potential threats that, while having no significant BVRs, did not contribute any to the identification of sub-segments. When we ran each LC cluster analysis, we identified any threat factors that were not significant in three models of 2, 3, and 4 sub-segments each. We then eliminated factors, one at a time, which were least significant.
3. Finally, once an LC model was identified in which a number of sub-segments could be cleaved apart, we ran a Chi-square Automatic Interaction Detection (CHAID) test to see if any of the fishermen's demographic characteristics acted as predictors of the different sub-segments.

Threats to Personal Fishing Livelihoods

In the first step of the analysis, industrial development exhibited the single most redundancy of all the threat factors, with 6 significant BVRs and was eliminated from the analysis first. After that, finding crew and labour (4 significant BVRs), aging workforce (3 significant BVRs), low market prices (2 significant BVRs), and challenges in selling enterprise at retirement (1 significant BVR) were dropped from the analysis in order.

In the second step of the analysis, we found that wharf access was insignificant in all model configurations with multiple latent classes, so dropped it from the analysis. We subsequently found that aquaculture development, too few seafood buyers, and declining fish stocks were threat factors that did not help in discriminating between fishermen sub-segments, so they were all dropped from the model in order.

This left us with three key threat factors – DFO fishery management regulations, operational regulations (e.g., Transport), and inflation and rising costs of fishing – in an LC cluster model that broke down into two distinct sub-segments. Statistically, the two segments exhibited significantly different opinions on both operational regulations and fishing costs (at the 10% significance level, $p < 0.10$), while their differences on DFO regulations were not quite significant ($p = 0.15$).

The first sub-segment consisted of 91.4% of all respondents (49 fishermen), while the second sub-segment consisted of the remaining 8.6% (6 fishermen). As can be seen in Figure 7, the large group of fishermen in Cluster 1 thought almost uniformly that rising costs were a very important threat and that fishery and operational regulations were moderate to high threats. A much smaller group of fishermen in Cluster 2 thought that regulations were generally of low to moderate importance and that costs were of moderate to high importance.

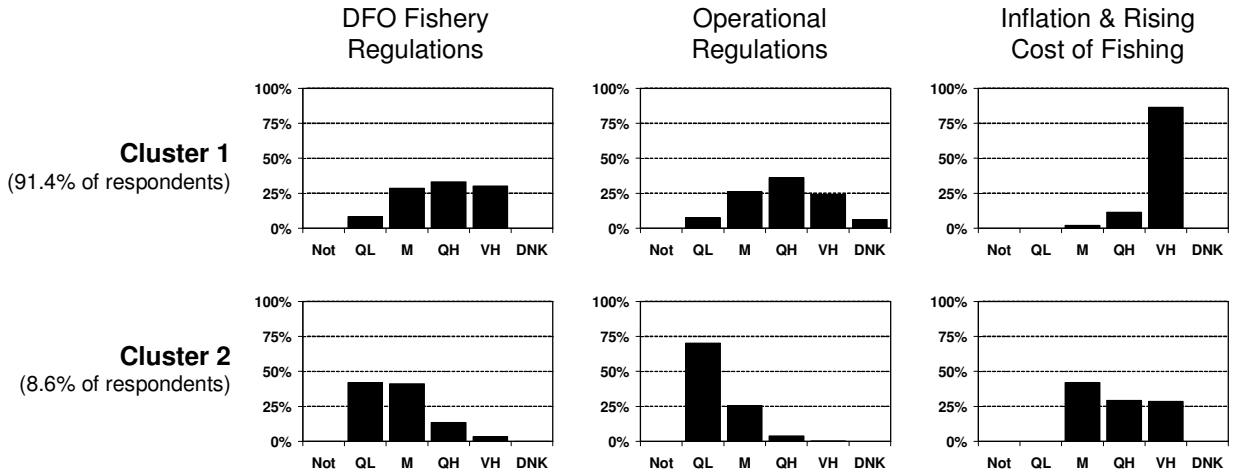

Figure 7 – Differences in perceived threats to individual fishing livelihoods between two sub-segments of Bay of Fundy fishermen.

Note that this LC cluster analysis does not imply that fishermen don't think that other factors are also important threats. This analysis tells us that, for our small sample of 55 fishermen in the Bay of Fundy, two distinct groups of fishermen could be identified based on their different perceptions about these three potential threats. None of the other potential threats provide additional information that can help us distinguish between people with different opinions.

Members of Cluster 1, the much larger cluster (91.4% of all respondents), view escalating fishing costs as a very serious threat to their fishing livelihood and view both fishing and other operational regulations as moderate to serious threats. Members of Cluster 2, on the other hand, view escalating costs as a moderate to serious threat and regulations as a moderate to quite low threat.

In the third step of the analysis, we found no significant predictors that explained the perceived threats of Clusters 1 and 2. That is, none of the demographic characteristics examined – fishermen's age, years fishing, whether one was raised in a fishing family, whether or not fishing was the most important revenue source for fishermen, and the proportion of household income coming from fishing – explained the difference between the threat perception patterns observed. This is likely because of the small sample size. With increased numbers of respondents, the statistical power of the CHAID analysis is much more likely to be able to identify significant demographic characteristics of fishermen in the different groups.

Threats to Rural Fishing Communities

In the first step of the second analysis, out-migration (people leaving the region) first exhibited the most redundancy of all the threat factors, with 6 significant BVRs; it was eliminated from the analysis first. After that, access to shores and beaches (which now bumped up to 7 significant BVRs), industrial development (5 significant BVRs), government regulation (4 significant BVRs), lack of regulation of non-fishing industries (3 significant BVRs), fishing costs (3 significant BVRs), and crew availability (2 significant BVRs) were dropped from the analysis in order.

In the second step of the analysis, we found that fish stock abundance was insignificant in all model configurations with multiple latent classes, so dropped it from the analysis. We subsequently found that too few seafood buyers and low market prices were threat factors that did not help in discriminating between fishermen sub-segments, so they were also dropped from the model in order.

This again left us with three key (but different) threat factors – expansion of aquaculture, rising coastal land prices, and wharf access – in an LC cluster model that broke down into three distinct sub-segments. Statistically, the three segments exhibited significantly different opinions on the threats posed by aquaculture (significant at the 10% significance level, $p = 0.094$) and by land prices and wharf access (both significant at the 5% level, $p = 0.036$ and $p = 0.042$, respectively).

The first sub-segment consisted of 52.5% of all respondents (28 fishermen), the second sub-segment consisted of 42.5% of respondents (22 fishermen), and the third smaller group consisted of the remaining 5.0% (3 fishermen). Fishermen in Cluster 1 tended to have moderate views on the threats posed by aquaculture expansion and rising coastal land prices, and thought that access to wharves was a relatively low threat. Fishermen in Cluster 2, on the other hand, viewed both aquaculture and rising land prices as very high threats to communities. They also thought that lack of access to wharves was a much more serious problem than respondents in the other two sub-segments did. The small group in Cluster 3 viewed wharf access as a very low threat and they thought rising land prices were either very important or they had no opinion on that factor.

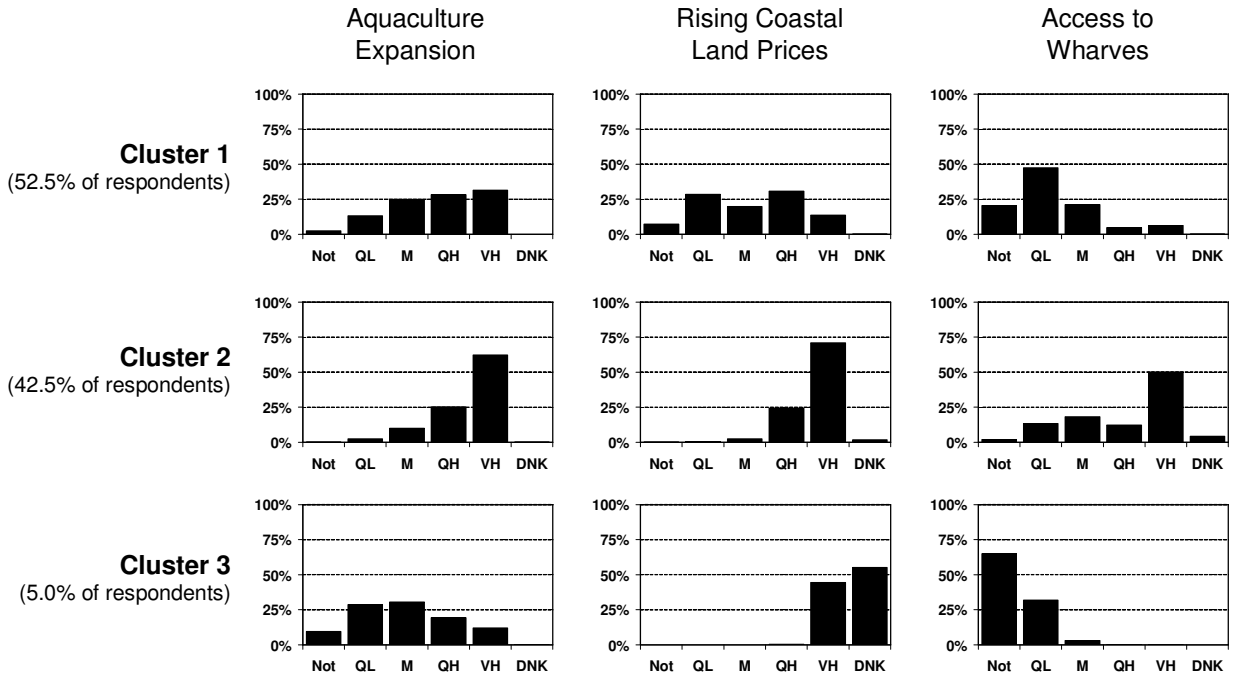

Figure 8 – Differences in perceived threats to fishing communities between three sub-segments of Bay of Fundy fishermen.

Again, these results do not imply that other threats are not important. Rather, there is some divergence in opinion amongst fishermen as to how important these three factors are and that divergence can help us explain how our sample breaks down into distinct sub-segments based on threat perceptions. We need only these three factors to explain those differences, not all the other factors that we also asked about.

Members of Cluster 1 (52.5% of all respondents) tended to view aquaculture expansion as a moderate to serious threat to community well-being, while they were relatively neutral on the issue of rising land costs, and tended to view wharf access as being moderately to not at all important. Members of Cluster 2 (42.5% of the sample) viewed all three factors as serious threats to community viability. Members of the smaller Cluster 3 (5.0% of respondents) were, on the other hand, quite neutral on aquaculture, viewed wharf access as a non-issue, and either viewed increasing coastal land prices as very serious or did not have an opinion (either way, they did not take the view that rising land prices were a low to quite high threat).

Again we ran a CHAID analysis to test if any demographic factors could explain the differences between threat perceptions. While the small sample made it impossible to differentiate amongst statistically significant predictors, we did see some indication (albeit

insignificant) that household fishing income might play a role in explaining differences in community-level threat perceptions.

Figure 9 below shows that the whole sample breaks into three sub-segments comprising 52.5%, 42.5%. and 5.0% of the whole sample. The second level of the 'tree' shows how membership in the three sub-segments varies across sub-segments that have different levels of dependency on fishing as a source of livelihood. Fishermen that had lower dependence on fishing (the branch on the left, with 0% to 74% of total household income derived from fishing) had much lower membership in sub-segment 2 and much higher membership in sub-segment 3. That is, fishers that had other sources of income tended to be less likely to view aquaculture expansion, rising coastal land prices, and wharf access as serious threats to coastal communities relative to full-time fishers that derived most of their household income from fishing. Similarly, fishermen who had a high level of dependence on fishing for their household livelihood were far less likely to be members of sub-segment 3, who viewed wharf access as unimportant and rising coastal land prices as very important.

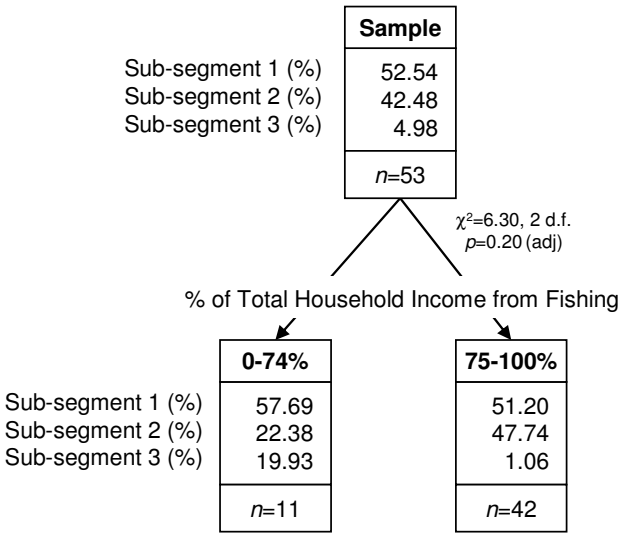

Figure 9– Influence of total household income from fishing (i.e., dependency on fishing income for personal livelihood) on perceived threats to coastal communities.

The differences in the second level of the CHAID tree are not statistically different even though it looks like there are differences to the naked eye. Again, this is because of the small sample. While we cannot be sure, we suspect that these differences between fishermen highly dependent on fishing income versus those less dependent on fishing would become statistically significant with a slightly larger sample size. As sample sizes grow larger and larger, the power

of the CHAID analysis to discriminate amongst respondents and identify significant predictors or threat perception patterns becomes stronger.

Home Port

The vast majority of respondents live within 25 km of their home fishing port (Figure 10).

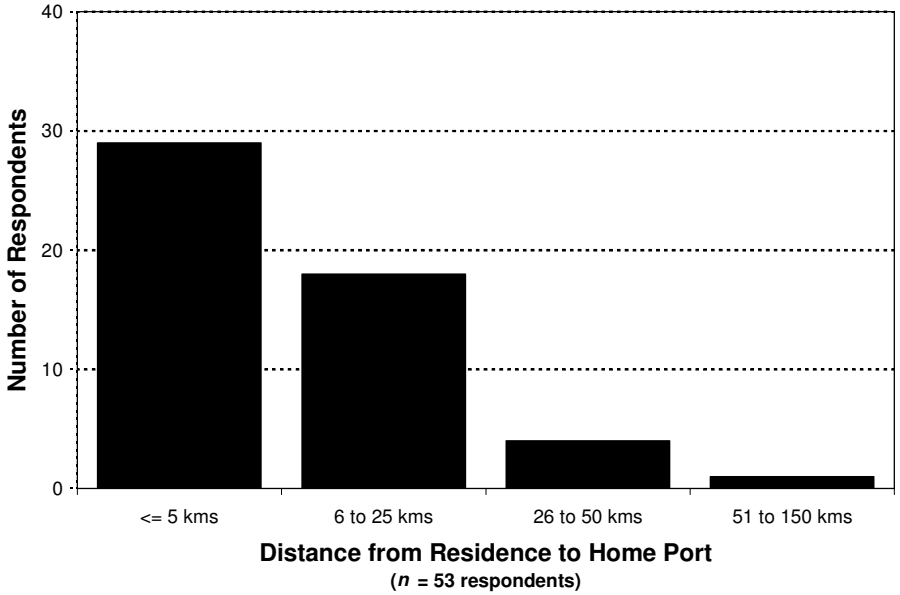

Figure 10

Vessel Characteristics

The average length and tonnage of fishing vessels for survey respondents is shown in Figure 11 and 12. Engine horsepower ranged from 11 to 3,208 hp (average = 460 hp) and engine age ranged from 1 to 38 years (average = 8.1 years). Fuel capacity ranged from 182 to 9,092 l (average = 1,922 l) and fuel consumption from 20 to 454 l/day (average = 208 l/day) or 500 to 600,000 l/yr (average = 15,919 l/yr). Note that some respondents reported both measures while some reported one only (and 5 reported neither). 54 respondents provided their vessel age, which ranged from 1 to 26 years (average = 11.3 years).

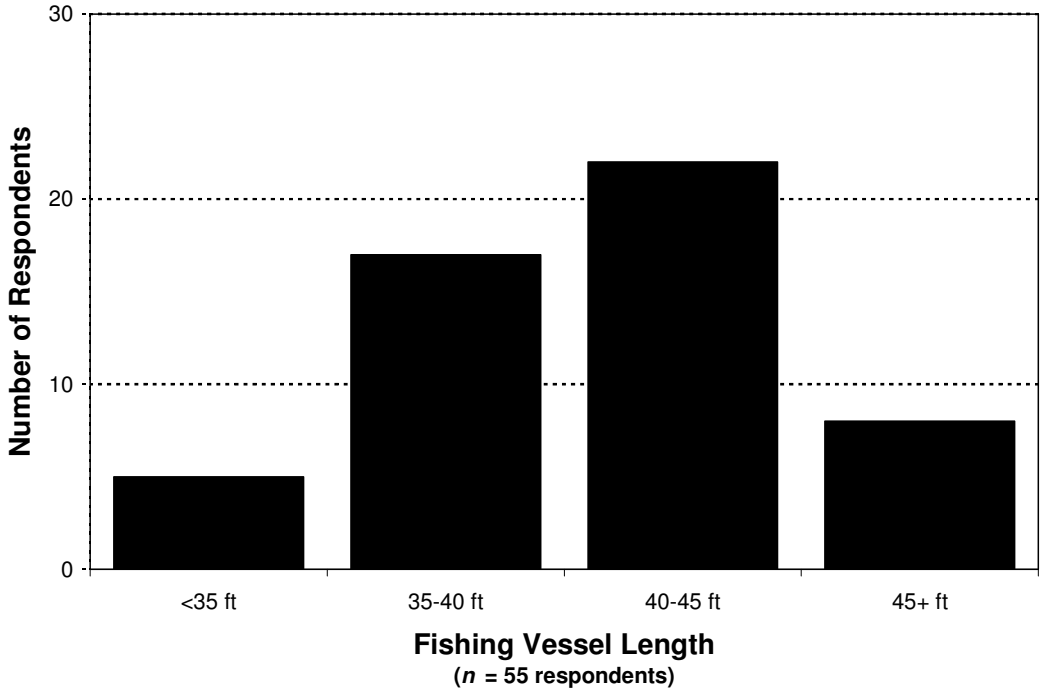

Figure 11

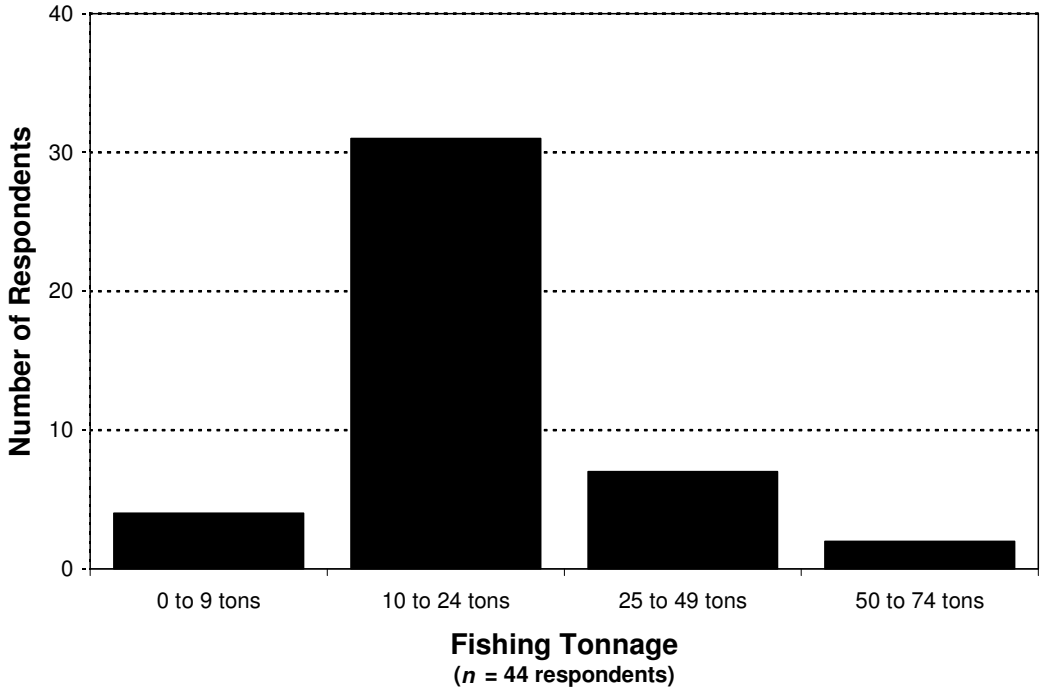

Figure 12

Crew Employment

Few respondents hire full time year-round help (see Figure 13). Many more hired part time year round crew or seasonal help (see Figures 14-16). In total, the 55 fishermen responding to this survey were responsible for generating an additional 30 full time year-round jobs, 61 seasonal fulltime jobs, 51 seasonal part-time jobs, and 567 days per year in casual employment.

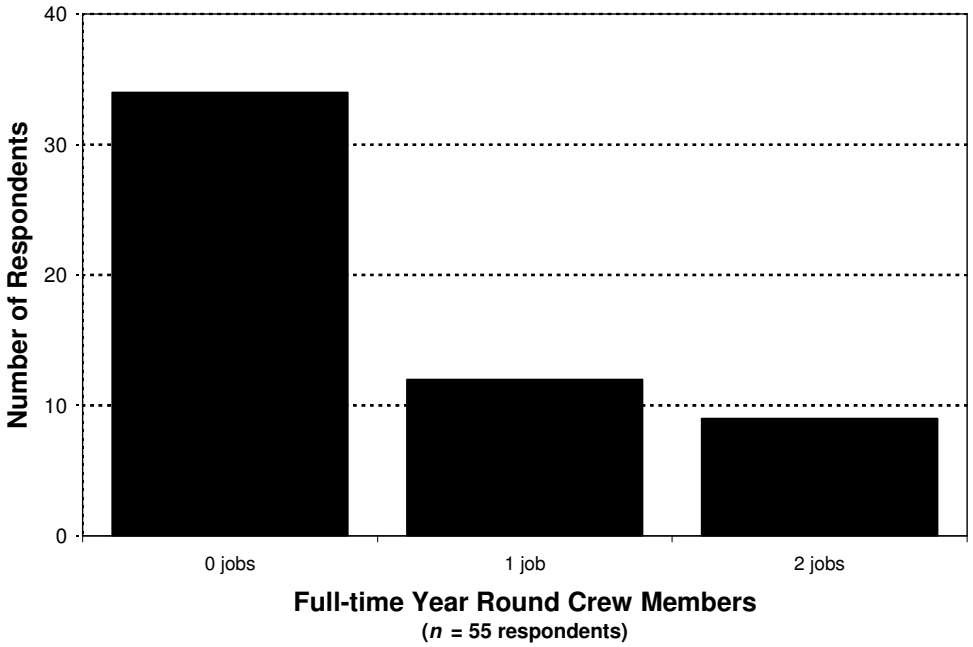

Figure 13

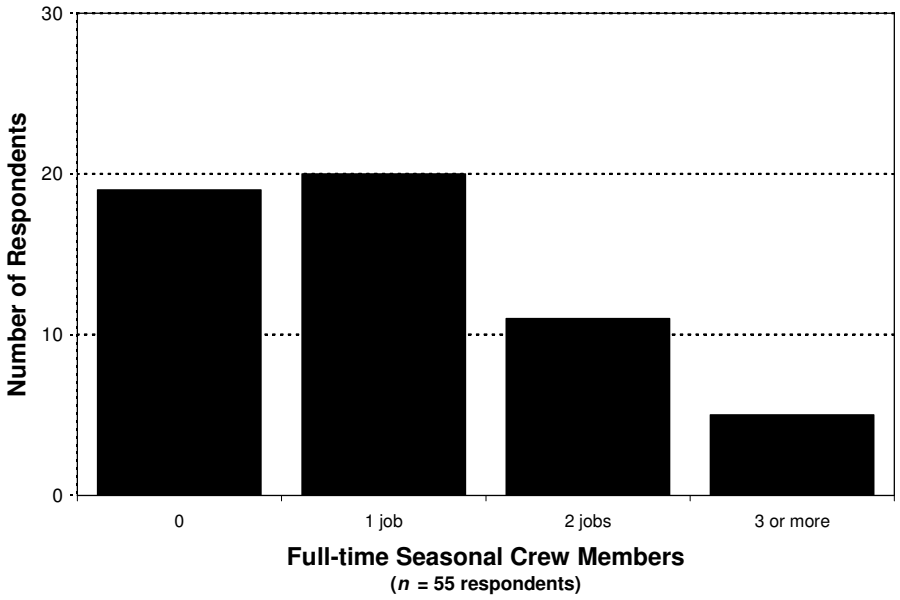

Figure 14

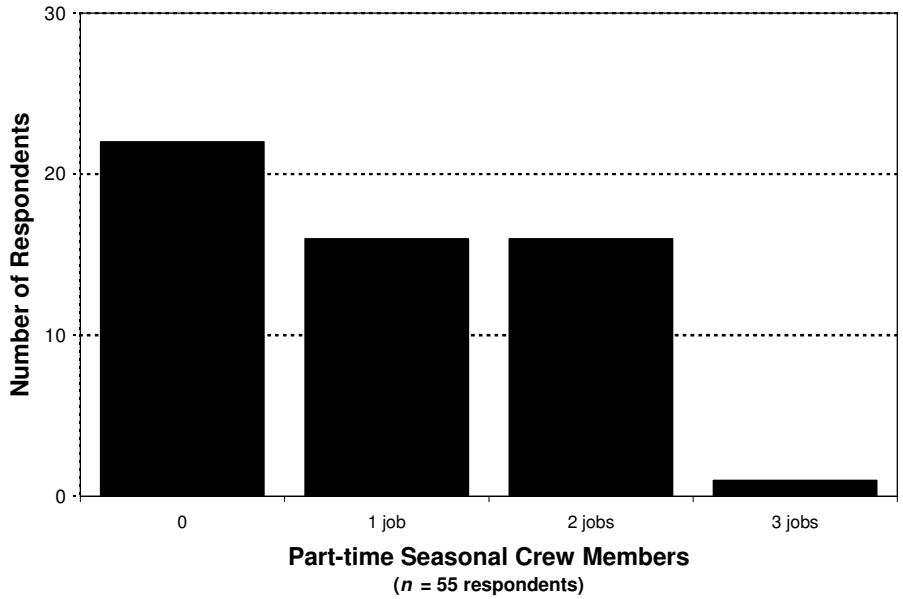

Figure 15

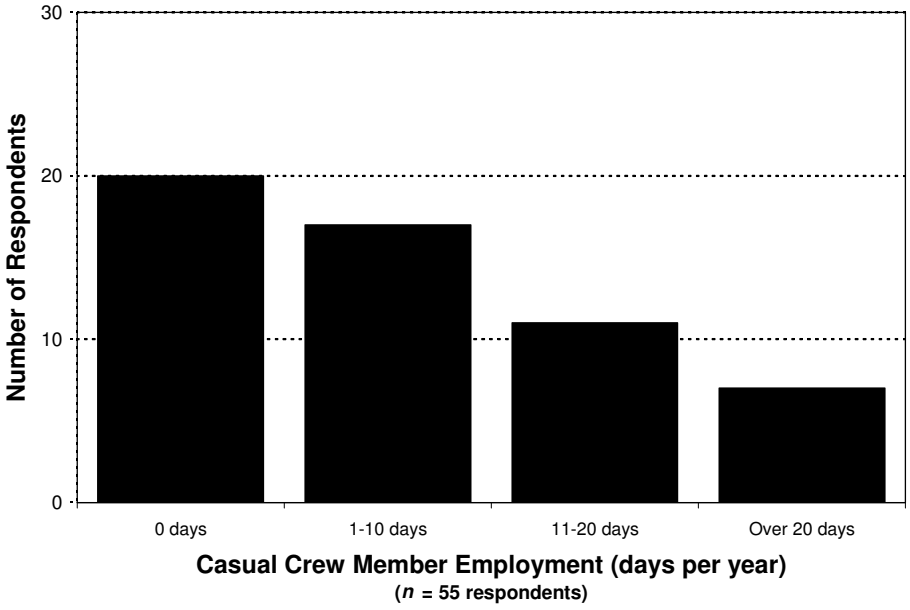

Figure 16

Licensing and Landings (2007)

Table 2 provides a summary of reported landings and income. It is important to note that not all respondents provided complete information on landings and earnings. Some reported earnings without providing landings by weight, and a few reported landings but not earnings. For example, of the 51 who reported an active lobster license, five did not report landing weights. For those who did provide landings by weight, it is clear that lobster is the most significant species landed, which is also indicated by the fact that all 51 licenses remain active among license holders. The survey respondents reported landing a total of over 896,000 lbs of lobster in 2007 with a total revenue in excess of 4.6 million dollars at an average price of $5.21 a pound. Over 2.2 million dollars of this revenue was spent locally on expenses, leaving a gross profit of almost 2.4 million.

Among those 19 active license holders for herring, 2 failed to report landings or earnings. The remainder reported landing a total of 7,054 hogshead of herring over the past year, making herring the second largest earner for local fishermen. Revenues of over 861,000 dollars were reported, based on an average price of 122 dollars per hogshead. Just under half of this revenue was spent locally, leaving a gross reported profit of over 460,000 dollars.

Six of the 20 active scallop license holders did not report their landings. Among those reporting landings, scallop represented a less important stock by weight (just over 80,000 pounds reported landed by respondents) but is significant as price per pound is higher than lobster (at 5.49 per pound). While the total revenue for scallops is just under 442,000 dollars, expenses are also higher, leaving a gross profit of 133,650 dollars.

Groundfish, despite stock declines, remains an important species by weight. The decline in the groundfishery however, can be estimated from the fact that over half the licenses (13 out of 24) are inactive. Groundfish landings represent a poor second after lobster (145,000 pounds) and earnings are also considerably less, at 84,000 dollars (58 cents per pound on average).

Finally, a number of other species combined were reported to represent a total of 187,000 pounds landed, at an average cost of 83 cents per pound. This represented total revenues of 155,000 dollars.

Total revenues reported from this sample of inshore fishermen for all species landed was over six million dollars, and total expenditures in the region of over three million dollars.

Table 2 – Summary of reported 2007 licensing, landings, and financial performance

	Lobster	Scallop	Groundfish	Herring	Other Species[a]	Total
Licenses						
Active	51	20	11	19	13	114
Inactive	0	11	13	10	12	46
Total	51	31	24	29	25	160
Landings	896,693 lbs	80,422 lbs	145,000 lbs	7,054 hogshead	187,000 lbs	
Revenue ($)	4,670,250	441,850	84,000	861,137	155,000	6,212,237
Average Price	$5.21/lb	$5.49/lb	$0.58/lb	$122.08/hogshead	$0.83/lb	
Expenses ($)	2,274,483	308,200	45,100	400,218	51,000	3,079,001
Gross Profit ($)	2,395,767	133,650	38,900	460,919		
Gross Margin	51.3%	30.2%	46.3%	53.5%		

[a] other species include dogfish, gaspereau, eel, shad, shad/bait, clam, mackerel, and sea urchin

Marketing

The inshore sector also provides revenues to a wholesale sector, as is indicated by the local sales. Only a small percentage of herring landed were sold outside of the region. 81.8% of seafood sales were in Charlotte and Saint John counties (not including herring, which were mainly in Charlotte county) (Table 3). Several fishermen used the comments section to provide feedback on marketing issues. Some report that there were too few buyers locally: "I find that price is too unpredictable, not enough buyers. The market is controlled by two few. We as fisher persons should have holding facilities available for us to maximize our profit." Other fishermen reported too many middlemen in the marketing chain or that middlemen were making too much of the profit: "There are far way too many middlemen. When we are getting 4.50$/lb and they are getting 9.99$/lb a half hour away. Expenses are killing fishermen. We need to organize and have a marketing manager to distribute our catch." Another fishermen reported that: "The buyers don't seem to be trying to develop new markets! My concern is that "big" guys can set a price and we have no recourse. For those who have been developing a market directly to the public, they now force the possibility of legislation brought on by lobbyists from big buyers, who are trying to have provincial legislation passed forbidding fishermen from selling their own products. Are we experiencing the erosion of our free market rights?" Another fisherman commented that: "fisheries all need an independent negotiator before season starts to agree upon a price that is fair for everyone involved". Other options were mentioned: "I believe that the fishermen should form a co-op and market their product." One fisherman commented on the

relationship between seasons and prices: "It is a buyers market. If everyone was catching fish at the same time, there is no market to sell to. You are left holding fish until you lose them. The same is true of lobster sales. Our season is too late in the fall and when Nova Scotia comes on line, our price drops. The seasons really need to be looked at and adjusted."

Table 3 – Location of fish sales

	Charlotte County	Saint John County	NB (other)	Nova Scotia	Other	Total
Lobster (lbs)	481,340	311,158	46,737	57,458	0	**896,693**
Scallop (lbs)	36,000	26,711	17,711	0	0	**80,422**
Groundfish (lbs)	29,800	0	0	115,200	0	**145,000**
Herring (hogshead)	6,829	0	0	0	225	**7,054**
Other Seafood (lbs)	186,000	0	0	1,000	0	**187,000**
Total	**733,140**	**337,869**	**64,448**	**173,658**	**0**	**1,309,115**

Some fishermen in our sample did retail directly to the public on occasion, although volumes tended to be small; 22 of 55 fishermen reported selling some lobster directly to the public, for example, with direct sales ranging from 1% up to 30% of their overall landings (average = 6.9% for those who did sell directly). For scallops, 7 fishermen reported selling 2% to 35% of their landings directly to the public (average = 9.6%). For groundfish, the numbers were slightly lower, with 3 fishermen selling between 1% and 20% of their landings to the public (7.5% average). Finally, for other species, only 1 herring fishermen reported selling a small amount (1% of landings) to the public; no other species landed were sold directly to the public.

Fishing Expenses

Table 4 – Index of equipment and supply purchase location[a]

	Charlotte County	Saint John County	NB (other)	Nova Scotia	Other	# Reporting Purchases
New Boat	7.9	1.0	-	6.0	0.1	15
Electronics	3.5	2.2	1.0	19.3	3.0	29
Gear	29.4	2.4	1.5	7.6	2.2	43
Truck	19.2	12.8	1.1	0.1	0.9	34
Boat Repairs	28.1	9.1	2.8	1.1	1.0	42
Science & Monitoring	22.0	3.0	1.0	-	-	26
Fuel	24.6	19.2	0.1	0.2	2.0	46
Wharfage	26.5	14.0	0.1	0.4	1.0	42
Association Dues	26.0	7.7	2.0	0.3	1.0	37
Insurance	9.0	7.5	2.5	21.0	1.0	41
Quota	3.0	2.0	-	-	-	5
Crew	25.9	13.2	-	1.2	1.2	41

Loan Payments	19.6	11.6	2.0	1.8	-	35

[a] Index calculated using weightings for each purchase and location of purchase. For example, 7 people reported buying a new boat (100% of purchase) in Charlotte County, 1 in Saint John County, and 6 in Nova Scotia. In addition, 1 person reported buying a boat with 90% of the cost attributed to Charlotte County and 10% to elsewhere (perhaps an engine from the U.S., for instance).

Enterprise Value

The total value of fishing enterprises for the 46 fishermen answering this question was $20.815 million. The breakdown of enterprise value is shown in Figure 17.

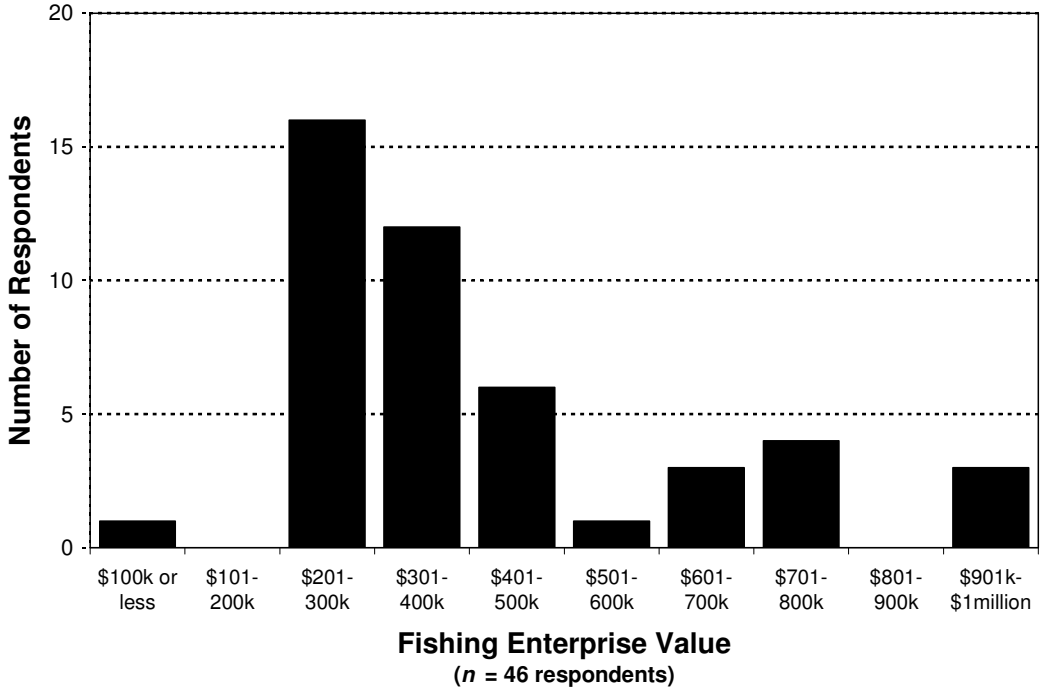

Figure 17 – Distribution of fishing enterprise value

Discussion

Some things to think about from the email discussions:
In 2009, there are 178 fishing boats in SWNB, if roughly 50 boats bring in $6m, then 178 boats would bring in 21.36 mil
Which is $53.4m industry in the Fundy North region alone

Grand Manan has another 125 licenses and they stock more $ per year then we do (in 2008 LFA 36 landed 1433 tons, Grand Manan landed 1805 tons) - that means that an average GM lobster boats lands 11.464 tons per year, a fundy North boat 8.05 tons per year, so each GM fisherman makes on average 142% of what a Fundy North fisherman makes (FN average value per boat $120,000, GM average per boat $170,000)

A guesstimate of the value of Grand Manan fishery in landings is $26.9m (they fish all the same species we do and do a little better across the board, I based this on the lobster landings - I looked at a few years and the ratio was about the same so I chose 2007-2008).
The Grand Manan Industry then would be worth about $67.25m

So all of SWNB fisheries are worth roughly $120.65m per year - does that sound right –

$120 m in gross output on roughly $50 m in sales might be a bit high, but not too much out of line.

Generally, you lump 4 p/t jobs into 1 f/t as rule of thumb. Casuals would be added up by days I suppose but that might not capture the full importance of casual work (these studies never do when you're dealing with economic impacts). I'll attach a tourism study with multiplier numbers in it. Tourism seems to be doubling up the number of jobs - basically one out of the sector for each job within. I saw an older report on oceans industry (which was total junk) that for some reason had a zero multiplier for wild fisheries - not sure what the rationale for that was, but I wouldn't see why you couldn't use the tourism 2:1 figure as an estimate. All of this work is really subjective and easy to poke holes in.

Sample Adequacy

Employment and Economic Impact Implications

Key Messages?

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Appendices