

A SOCIAL AND ECONOMIC ANALYSIS OF
COMMERCIAL FISHERIES IN NORTH CAROLINA:
Atlantic Ocean

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INTRODUCTION

Marine fisheries play an important role in North Carolina's coastal communities. Supporting commercial and recreational fisheries that supply income, food, recreation, and employment, these resources are of great economic and social importance. Instead of focusing on state waters (0 to 3 miles offshore) this study focuses on commercial fishermen who operate in the federal Exclusive Economic Zone (EEZ), 3 to 200 miles offshore. The commercial fishermen operating in the EEZ tend to be more diverse than fishermen operating closer to shore, ranging from rod and reel fishermen targeting snapper, to troll fishermen targeting king mackerel, and even offshore shrimp trawlers. Additionally, species caught in federal waters are managed by several different federal entities, namely the Mid-Atlantic Fisheries Management Council (MAFMC), the South Atlantic Fisheries Management Council (SAFMC), and the National Marine Fisheries Service (NMFS). These agencies are charged with creating fisheries management plans (FMPs) that regulate the amount of fish harvested. Understanding the social and economic characteristics of commercial fishermen is an important component of these FMPs, and a necessity for understanding the impact regulations have on commercial fishermen. As such, both state and federal FMPs utilize socioeconomic information as required by the North Carolina Fisheries Reform Act of 1997, and the Magnuson Stevens Fishery Conservation and Management Reauthorization Act of 2006.

The North Carolina Division of Marine Fisheries (NCDMF) has conducted a series of studies aimed at gathering social and economic information on North Carolina's marine fisheries for use in FMP creation. These studies include previous analyses of Atlantic Ocean fisheries (Crosson 2009, Chevront and Neal 2004), as well as fisheries in the Albemarle Sound (Hadley and Wiegand 2014, Crosson 2007a, Diaby 2000), Pamlico Sound (Hadley and Wiegand 2014, Crosson 2007a, Diaby 2002), Core Sound (Crosson 2007b, Chevront 2002), and waters from Beaufort Inlet to the South Carolina state line (Crosson 2010, Chevront 2003). These analyses are updated approximately every five years. The results are then used in the socioeconomic section of state FMPs as well as in commercial fishing economic impact models used by NCDMF.

Study Area

The fishermen in this study operate in Atlantic Ocean federal waters and land at least a portion of their catch in North Carolina. Specifically, the federal Exclusive Economic Zone is defined as including waters from three to 200 miles offshore (Figure 1). A convergence of major currents creates a natural divide of the EEZ. Waters north of Cape Hatteras are cooled by the Labrador Current while those south of the Cape are warmed by the Gulf Stream. As a result, there is a distinct difference between the fisheries you see north and south of Cape Hatteras. While some of the fishermen interviewed in this study operate in other waterbodies, their activities there are not the focus of this study.

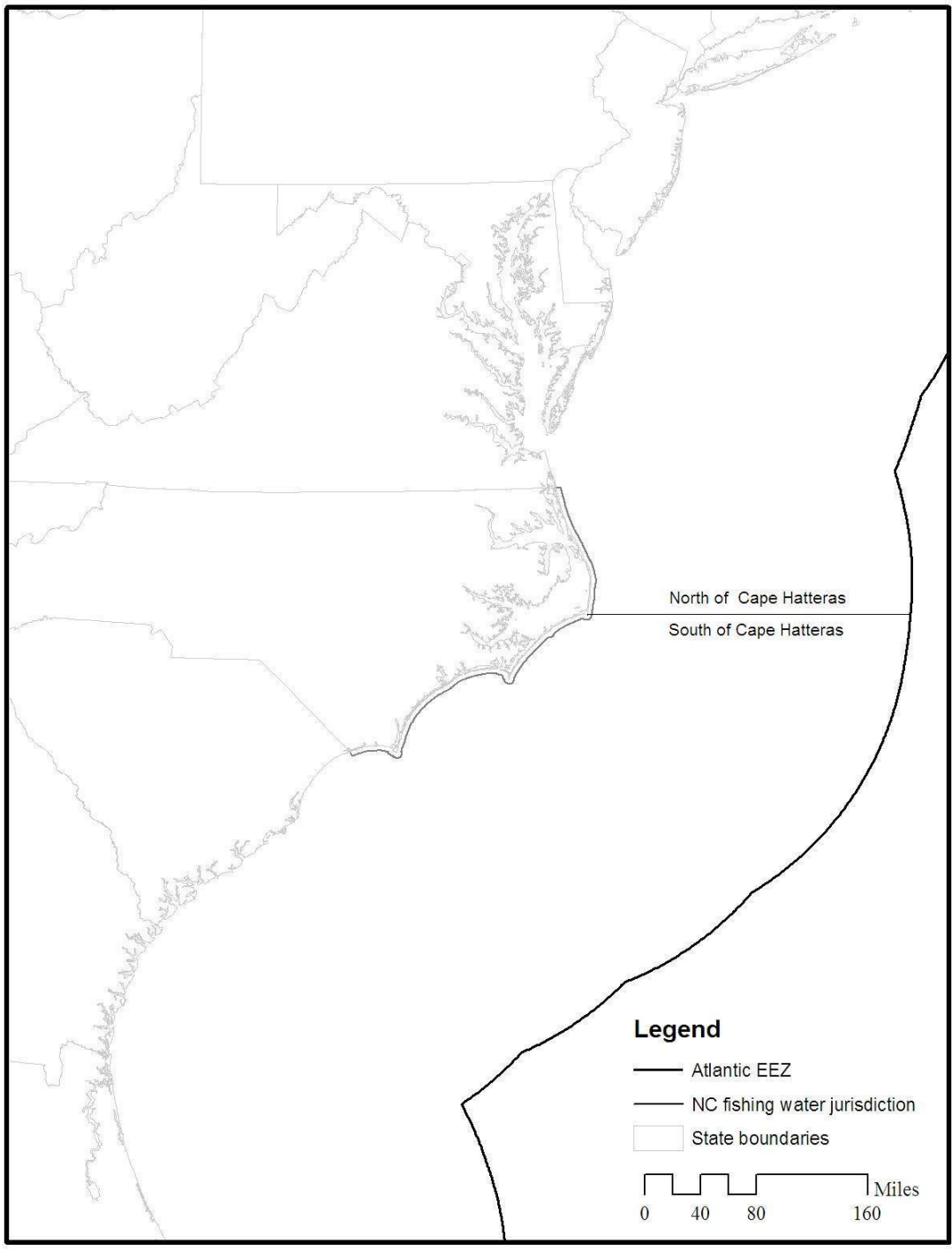


Figure 1. Map of North Carolina State Waters and the Exclusive Economic Zone (NC DMF GIS Program).

Study Objectives

There were three primary objectives of this study:

1. To describe the socioeconomic characteristics of commercial fishermen operating in the Atlantic Ocean off the coast of North Carolina, including demographics, dependence on commercial fishing and fishing business characteristics;
2. To collect cost and earnings information from commercial fishermen operating in the Atlantic Ocean to improve estimates of the cost, earnings, and economic returns associated with commercial fishing; and
3. To evaluate commercial fishermen perceptions regarding current fisheries management practices, the importance of fishing in their communities, and relevant issues currently facing the commercial fishing industry.

METHODOLOGY

Recruitment and Participation Rates

In 2016, a list of 496 commercial fishermen was compiled from the NCDMF license database. This list reported every person or business that landed at least \$1000 in ex-vessel value of seafood from water bodies in the study area in 2015. Licenses included were the Standard Commercial Fishing License (SCFL), the Retired Standard Commercial Fishing License (RSCFL), and the Land or Sell License.

A project specific interviewer contacted fishermen by mail and by phone requesting their participation in the survey. In May of 2016, all 496 fishermen were sent a mailing that contained a letter introducing the survey project, a link to an online copy of the survey as well as a hard copy of the survey and a return envelope. To incentivize fishermen to complete the survey, the introduction letter explained that individuals who complete the survey would be eligible to participate in a prize drawing for one of multiple Walmart gift cards in the amount of \$10. In June of 2016, fishermen who had not responded to the survey distribution were called and asked to participate by phone. Of the 496 possible respondents 136 completed the survey, a response rate of approximately 27%. While low, this response rate is on par with previous survey attempts. The majority of the non-responses were due to fishermen that were unable to be located and contacted. Only a small number of fishermen directly refused to complete the survey. Additionally, Atlantic Ocean fishermen tend to travel farther and be out of the water longer than inshore fishermen, making them more challenging to contact.

Survey Instruments

The NCDMF Fisheries Economics program aims to survey commercial fishermen on a staggered five-year basis. Fishermen representing each area of the coast are expected to be surveyed in a given year, with the goal that the survey will be updated again in five years. For longitudinal purposes, Cheuvront (2002, 2003) and Cheuvront and Neal (2004) refined the survey to the point that the general format is set, with minor modifications made to reflect each area's specific fisheries and additional interests at the time of survey administration.

The current survey, used in this study, consists of 52 questions and took approximately 30 minutes to complete when conducted over the phone. The data collected in this survey (Appendix A) addressed five key areas of interest:

1. Individual fishermen socio-demographics and reliance on commercial fishing;
2. Fishing business characteristics and cost;
3. Vessel characteristics and expenses;
4. Target species and gear;
5. Perceptions and outlooks regarding commercial fishing and fisheries management.

Data from the survey was recorded by hand and then coded into a Microsoft Excel database. Following which frequency and univariate analyses were performed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS). Economic impact estimates were calculated using IMPLAN modeling software and the NCDMF economic impact model.

SURVEY RESULTS

Demographics

The Atlantic Ocean survey respondents were predominately male (99%) and white (94%). The average age of commercial fishermen was 52 years, through there were active fishermen as young as 15 and as old as 82 years. The majority of fishermen were married (82%) and had at least a high school education (90%). Survey respondents indicated living in their current communities an average of 37 years, with many fishermen still living in their birth community (45%). Majority of respondents were from Dare (26%), Carteret (19%), and New Hanover (17%) counties (Table 1).

The average respondent had 26 years of commercial fishing experience, though there were fishermen who had been active for only a year, and fishermen who had been active for more than 80 years. Most respondents considered themselves to be full-time fishermen (59%), however 60% of fishermen indicated that they had a second source of income. Fishermen indicating that they maintained a second job were often still involved in the fishing industry in some manner (41%) including: charter fishing, fish house operation, and marine construction. Other fishermen income sources included: construction, social security, and the service industry. Survey respondents typically lived in households with two (37%) to four (22%) residents and had an annual household income between \$30,000 and \$75,000 dollars (41%). On average, respondents indicated that 67% of their income come from commercial fishing, though results show that commercial fishing can account for as little as 1% and as much as 100% of an individual fisherman's income (Table 1).

Table 1. Demographics of Atlantic Ocean survey respondents.

	Frequency	Percent		Frequency	Percent
Gender			# of People in Household		
Male	132	99%	1	20	15%
Female	1	1%	2	49	37%
Race			3	28	21%
White	125	94%	4	29	22%
African American	2	2%	5	4	3%
Asian American	5	4%	6	1	1%
Hispanic	1	1%	County of Residence		
Marital Status			Dare	35	26%
Married	104	82%	Carteret	25	19%
Divorced	12	9%	New Hanover	20	17%
Widowed	4	3%	Brunswick	23	15%
Separated	2	2%	Onslow	9	7%
Never Married	5	4%	Other	21	16%
Education			Years in Community		
Less than High School	12	9%	Average	37	
High School Graduate	43	32%	Minimum	2	
Some College/2-year Degree	39	29%	Maximum	87	
College Graduate	39	29%	Age		
Household Income			Average	52	
Less than \$15,000	0	0%	Minimum	15	
\$15,001-\$30,000	10	9%	Maximum	87	
\$30,000-\$50,000	29	27%	Years Fishing		
\$51,001-\$75,000	26	24%	Average	26	
\$75,001-\$100,000	26	24%	Minimum	1	
More than \$100,000	18	17%	Maximum	65	
Refuse to answer	27	20%	% Income from Commercial Fishing		
Fisherman Status			Average	67	
Full Time	79	59%	Minimum	1	
Part Time	54	41%	Maximum	100	

Seasonality

Based on survey responses the peak time for commercial fishing in the Atlantic Ocean falls between July and November with over 85% of respondents spending time fishing the area. The slowest time in the Atlantic Ocean fell between February and June. Majority of fishermen indicated working the water year-round (58%) (Table 2). Most (80%) of fishermen are the sole-owner of their commercial fishing business, while 5% have a partnership with other fishermen, and 14% are a part of a corporation.

Table 2. Months of fishing activity for Atlantic Ocean survey respondents.

Month	Number (n=131)	Percent
January	97	74%
February	91	69%
March	95	73%
April	100	76%
May	106	81%
June	107	82%
July	111	85%
August	113	86%
September	119	91%
October	117	89%
November	113	86%
December	107	82%
All Year	76	58%

Fishing Vessels and Business Expenses

Almost all the Atlantic Ocean respondents (98%) owned at least one registered fishing vessel. Sixty-three percent owned only one vessel, 25% owned two vessels, and 10% owned three or more vessels. For data analysis purposes vessels were divided into three different categories: small vessels (less than 19 feet in length), medium vessels (between 19 and 38 feet in length), and large vessels (greater than 38 feet in length). For their primary vessel, 8% of fishermen utilized a small vessel, 65% utilized a medium vessel, and 27% utilized a large vessel (Table 3).

Table 3. Summary characteristics of Atlantic Ocean survey respondents' vessels.

	Small (n=10)	Medium (n=83)	Large (n=35)
Average Length (feet)	15.6	28.5	51.9
Average Crew Size	1.4	2.2	2.8
Average Years Owned	20.6	12.0	15.6
Average Market Value	\$6,379	\$88,705	\$200,412

When considering trip expenditures, it is important take into account vessel size, as larger vessels tend to have higher operating costs. Total per trip expenses were highest for large vessels (\$4,311), followed by medium vessels (\$413), and smaller vessels at (\$91) (Table 4).

Table 4. Mean trip expenses by vessel size for Atlantic Ocean survey respondents.

	Small Vessels	Medium Vessels	Large Vessels
Fuel and Oil	\$76.33	\$284.71	\$2,754.09
Ice	\$1.11	\$30.92	\$174.53
Groceries	\$8.33	\$30.95	\$460.91
Bait	\$5.56	\$66.72	\$921.56
Total Per Trip	\$91.33	\$413.30	\$4,311.09

Table 5 shows the estimated per trip expenditures and estimated annual expenditures for fishermen in the Atlantic Ocean. Both average and median expenditures were estimated. Using both estimates helps to account for variations in fishing vessel size and operation. Large vessels and operations are associated with higher operating costs and as a result skew the summarized expenditures data upward. This results in mean values that are, in some cases, as much as five times higher than matching median values.

Table 5. Mean and median fishing expenses of Atlantic Ocean survey respondents.

Trip Expenses	Average	Median
Fuel and Oil	\$943.30	\$160.00
Bait	\$73.82	\$15.00
Ice	\$148.79	\$20.00
Groceries	\$284.95	\$30.00
Other	\$674.08	\$0.00
Total Per Trip	\$2,124.95	\$225.00

Annual Expenses	Average	Median
Labor	\$21,975.91	\$3,000.00
Loan Payments	\$2,993.52	\$0.00
Vessel/Gear Repairs	\$9,393.82	\$3,000.00
Docking Fees	\$1,160.09	\$350.00
New Gear	\$6,055.00	\$2,000.00
Insurance	\$2,616.69	\$903.00
Vessel Registration	\$259.91	\$100.00
State Permits	\$618.48	\$425.00
Federal Permits	\$197.42	\$57.50
Other	\$569.39	\$0.00
Annual Total	\$45,840.24	9,835.50

Majority of fishermen operating in the Atlantic Ocean pay their crew using a share system (69%). The captain of the vessel received, on average, 26% of the profits, the boat owner received 49%, and the crew of the vessel received 29%. Fishermen that do not pay their crew using shares typically fish alone (58%) pay a per trip rate (24%) or a per day rate (18%).

Gear and Target Species

There are three different categories of species present in Atlantic Ocean waters off the North Carolina coast: pelagic species that spend much of their time in the upper waters, benthic species that spend much of their time along hard bottoms, and finally assorted species found throughout the water column. Among survey respondents, king mackerel were the most commonly targeted species (40%), followed closely by snapper/grouper species (37%) and Bluefin tuna (20%). Table 6 summarizes the variety of species targeted in the Atlantic Ocean.

Table 6. Species targeted by Atlantic Ocean survey respondents.

Species	Frequency	Percent
King Mackerel	52	40%
Snapper/Grouper	49	37%
Bluefin Tuna	26	20%
Croaker	25	19%
Shrimp	25	19%
Yellowfin Tuna	25	19%
Dolphinfish	24	18%
Spanish Mackerel	18	14%

Majority of fishermen working in the Atlantic Ocean use rods and reels (49%). It should be noted that the category of rods and reels includes: bandit reels, trolling lines, and green sticks. Fishermen also reported using gill nets (28%), shrimp trawls (16%), and longlines (7%) (Table 7). Majority of fishermen utilize a single gear type year-round (64%), while 22% utilize two years, and 12% use three or more gear types.

Table 7. Gears used by Atlantic Ocean survey respondents.

Gear	Frequency	Percent
Rod and Reel	74	49%
Gill Net	42	28%
Trawl	25	16%
Longline	11	7%

For many of these species, fishermen are required to have an additional permit beyond a state commercial fishing license. These permits are limited in number and frequently purchased from other fishermen. The most commonly owned permit was for king mackerel (46%), followed by the snapper/grouper permit (28%), and the dolphin/wahoo permit (27%) (Table 8). While these permits are originally purchased from federal and state governments for approximately \$25 - \$60, individuals who have entered the fisheries since then have had to purchase permits at a higher price. King mackerel fishermen indicated paying an average of \$3,899 to enter the King Mackerel fisheries, with the highest recorded price at \$7,500. For the snapper/grouper fishery complex fishermen indicated paying an average of \$31,946, with the highest recorded price at \$60,000.

Table 8. Species permits purchased by Atlantic Ocean survey respondents.

Permit	Frequency	Percent
King Mackerel	53	46%
Snapper/Grouper	32	28%
Dolphin/Wahoo	31	27%
Tuna	28	25%
Spanish Mackerel	25	22%
Shark	7	6%
Swordfish	5	4%
Federal Shrimp	3	3%
Black Sea Bass	3	3%
Monkfish	2	2%

Income

In 2015, 34% of Atlantic Ocean fishermen surveyed indicated making more than \$30,000 from commercial fishing alone. Additionally, 65% of respondents indicated a total household income of more than \$50,000 (Table 9). This is slightly higher than the 2015 median annual household income in North Carolina (\$46,868), but in line with Dare County (\$54,496).

Table 9. Reported annual income from commercial fishing and annual household income of Atlantic Ocean survey respondents.

Commercial Income	Frequency	Percent	Household Income	Frequency	Percent
\$0 or lost money	20	17%	-	-	-
\$1-\$5,000	20	17%	-	-	-
\$5,001-\$15,000	24	20%	>\$15,000	0	0%
\$15,001-\$30,000	15	13%	\$15,001-\$30,000	10	9%
\$30,000-\$50,000	20	17%	\$30,001 - \$50,000	29	27%
\$50,001-\$75,000	11	9%	\$50,001 - \$75,000	26	24%
\$75,001-\$100,000	5	4%	\$75,001 -\$100,000	26	24%
More than \$100,000	5	4%	More than \$100,000	18	17%
<i>Total</i>	<i>120</i>	<i>-</i>	<i>Total</i>	<i>109</i>	<i>-</i>
<i>Refused</i>	<i>16</i>	<i>-</i>	<i>Refused</i>	<i>27</i>	<i>-</i>
<i>Grand Total</i>	<i>136</i>	<i>-</i>	<i>Grand Total</i>	<i>136</i>	<i>-</i>

Overall, survey results indicate that commercial fishermen operating in the Atlantic Ocean are making more money in 2015 than they were when the previous Atlantic Ocean survey was conducted (Crosson 2009). In 2007, only 19% of survey respondents operating in the Atlantic Ocean were making more than \$30,000 from commercial fishing alone (Figure 2). Similarly, in 2007 only 54% of survey respondents indicated a total household income over more than \$50,000 (Figure 3).

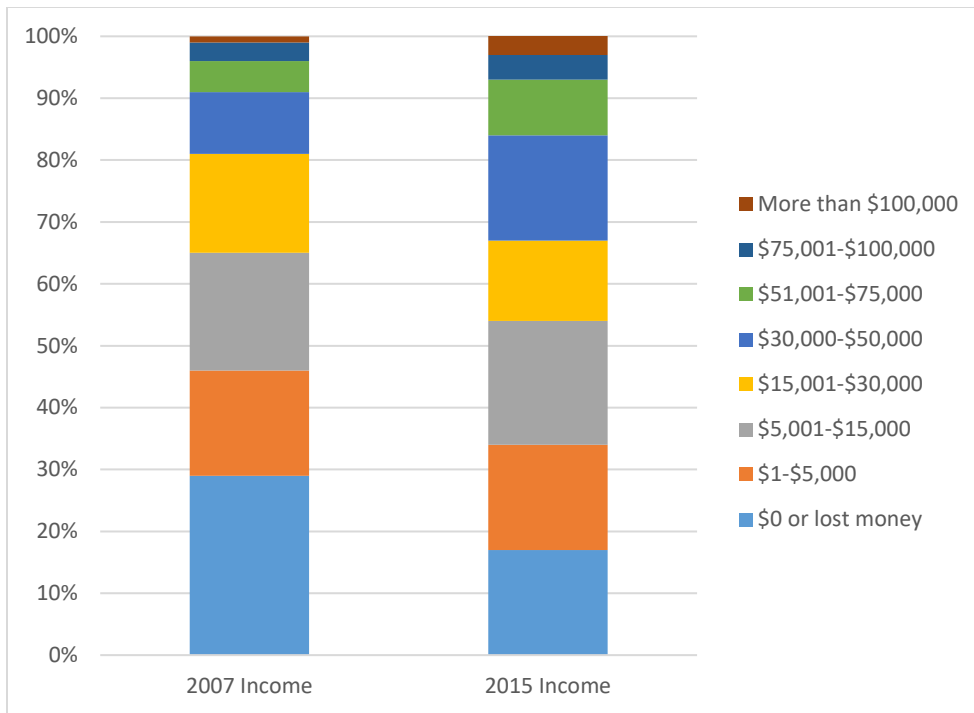


Figure 2. Commercial fishing income of Atlantic Ocean respondents.

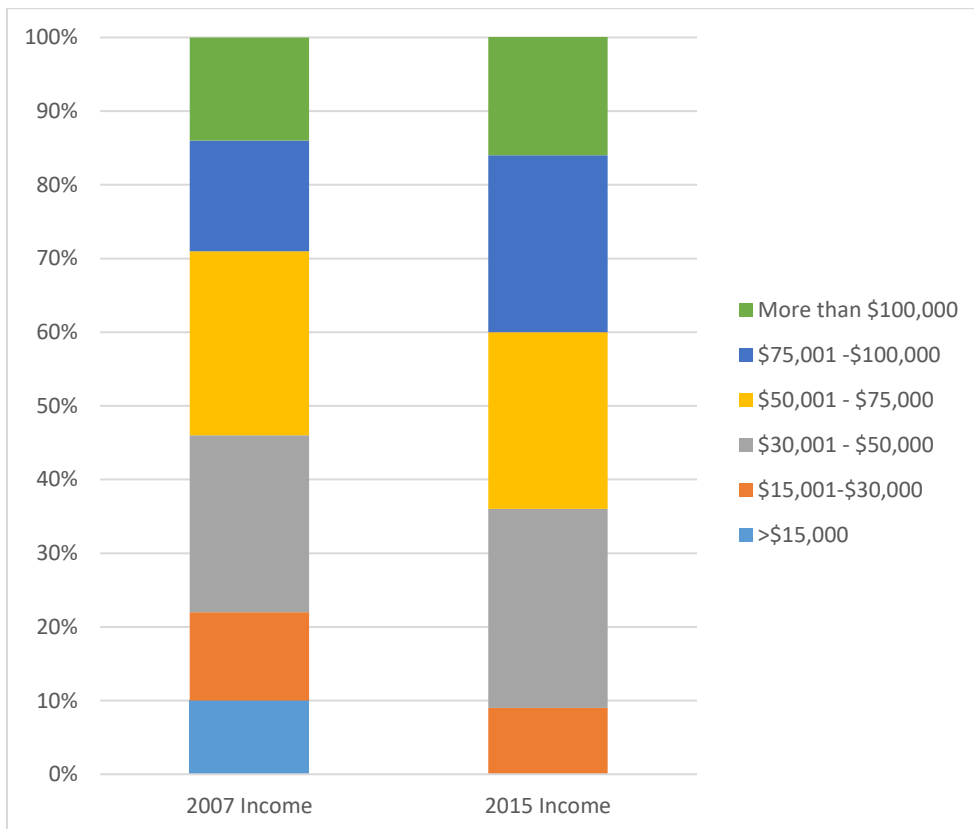


Figure 3. Household income of Atlantic Ocean respondents.

Healthcare

Majority of survey respondents indicated that they currently had some form of health insurance (85%). Of those individuals, 49% purchased healthcare themselves, 29% indicated being covered through another job or a spouse's job, and 19% were under Medicare/Medicaid. Individuals that held insurance were paying an average of \$429 dollars of month per plan, with premiums as ranging from cost-free to \$1800. On average, insurance plans were covering two individuals, but as low as one individual and as high as four individuals were covered by a single plan. The per person average for healthcare premiums was \$257.83 per month (Table 10).

Of the fisherman purchasing healthcare for themselves 43% are purchasing healthcare through the federal exchange created by the Affordable Care Act (ACA). Those not using the ACA (57%) are purchasing their healthcare through a private company. Fishermen using the ACA are primarily on the silver health plan (39%), though many fishermen were unsure of which level health plan they had purchased (29%).

Majority (69%) of survey respondents did not believe that access to health insurance was affecting their commercial fishing business. Similarly, only 26% of respondents felt that strongly that commercial fishing was affecting their health. Of the fishermen that had health insurance, only 52% had a plan that covered on the water injuries (compared to 19% who did not, and 30% who were unsure).

Table 10. Healthcare status of Atlantic Ocean survey respondents.

	Frequency	Percentage		Frequency	Percentage
Health Insurance Effect Business?			Monthly Premium		
Yes	35	31	Average	479	
No	78	69	Minimum	0	
Health Insurance Status			Maximum	1800	
Yes	110	85	Individuals Covered		
No	20	15	Average	2	
Health Insurance Provider			Minimum	1	
Self	55	49	Maximum	4	
Other Job	18	16	Purchase Method		
Spouse's Employer Plan	15	13	Federal Exchange	26	43
Medicare/Medicaid	21	19	Private Company/Broker	34	57
Other	4	4	Federal Plan		
Cover On the Water Injuries?			Bronze	4	14
Yes	54	52	Silver	11	39
No	20	19	Gold	2	7
Unknown	30	29	Unknown	11	29

Perceptions

Survey respondents were asked a series of questions concerning their opinion on the current state of commercial fishing. To understand the challenges facing commercial fishermen in the Atlantic Ocean, survey respondents were asked to rate how certain issues were affecting their fishing business on a scale of 1 (unimportant) to 10 (very important). The issue of most concern was competition from imported seafood, followed by fuel prices. Of least concern was competition with local fishermen and crew and labor issues (Table 11). When asked if they would still be fishing in ten years, only 55% of respondents answered yes. The two concerns most often cited were old age and over-regulation of the industry.

Table 11. List of issues of concern to Atlantic Ocean survey respondents.

Ranking	Issue	Rating
1	Competition from imported seafood	7.92
2	Fuel prices	7.58
3	Weather	7.40
4	Predicting the future for your commercial fishing business	7.35
6	Development of the coast	7.14
5	Keeping up with proclamations or changes in rules	7.07
7	Losing working waterfronts like docks, marinas, and fish houses	6.95
8	Federal regulations	6.85
9	Seafood prices	6.84
10	Cost of commercial licensing, permits, or endorsements	6.80
11	Seasonal or area closures	6.76
12	State regulations	6.51
13	Endangered species regulations	6.10
14	Gear restrictions	5.87
17	Trip limits	5.80
15	Quotas	5.69
16	Size limits	5.31
18	Illegal sale of fish	5.11
19	Obtaining financing for repair/replacement costs	4.81
20	Record keeping (trip tickets, tax log books, etc.)	4.74
21	Competition with recreational fishermen	4.27
22	Overfishing	3.83
23	Competition with non-local fishermen	3.46
24	Crew or labor issues	3.30
25	Competition with local fishermen	3.20

Survey respondents were also asked to agree or disagree with statements on how commercial fishing influences their daily lives and local communities on a scale of 1 (completely disagree) to 10 (completely agree). In line with previously listed concerns, 58% of fishermen did not agree with the statement “I will be able to make a living fishing in the future.” Despite this, results suggest that commercial fishing plays a very important role in the respondents’ communities both in terms of their history (84%) and economy (71%). Majority of respondents felt they were respected in the community (51%) and that their community actively supported commercial fishing (51%). Most fishermen felt that they weren’t working harder to catch fish now than they did in the past (53%) (Figure 4).

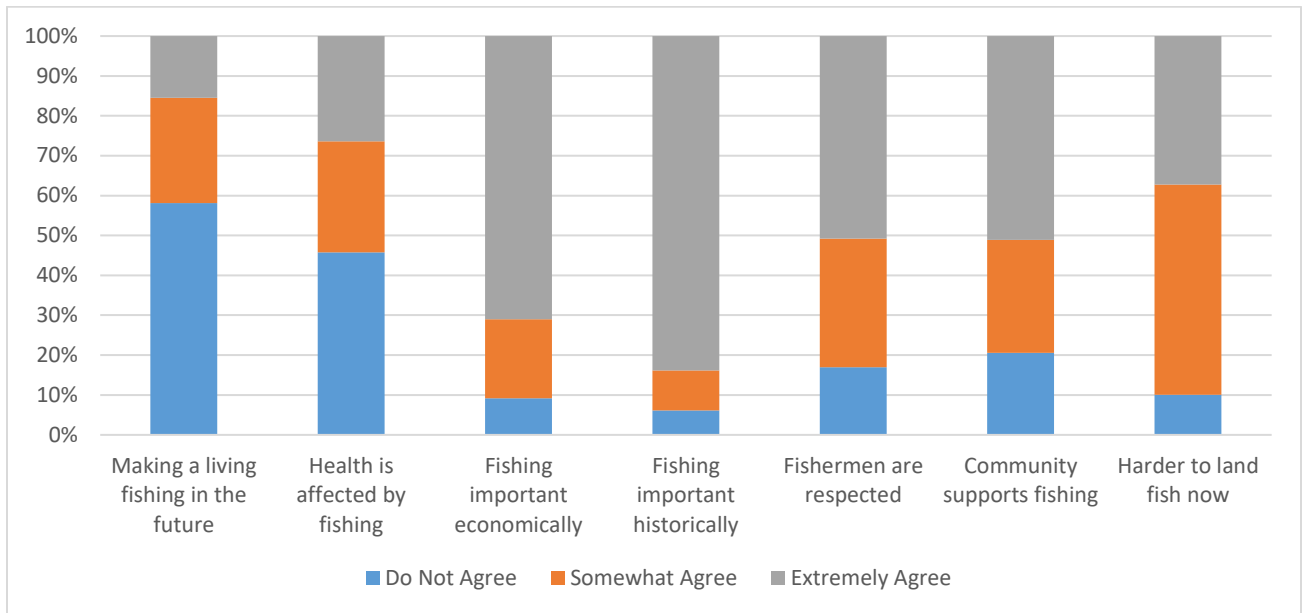


Figure 4. Atlantic Ocean survey respondents' agreement with statements regarding commercial fishing.

User Group Conflicts

Respondents were also asked whether they had any negative experiences with other commercial fishermen, recreational fishermen, federal regulations, or state regulations within the last year (Table 12). Federal regulations were the most cited conflict, with 36% of fishermen indicating that they had negative experiences, followed by state regulations (35%), recreational fishermen (23%) and other commercial fishermen (15%). A variety of concerns were expressed, the majority of which involved over-regulation of Atlantic Ocean fisheries. Similarly, many respondents expressed a distrust for the science used to make management decisions. Respondents frequently mentioned that fishermen were more likely to fight amongst themselves than work together.

Table 12. Frequency of Atlantic Ocean survey respondents indicating conflicts.

User Group	Frequency	Percent
Federal Regulation	47	36%
State Regulation	44	35%
Recreational Fishermen	30	23%
Other Commercial Fishermen	20	15%

Macroeconomics

While there has been some variation, the weight and value has been of commercial seafood landings has been relatively stable. Between 2000 and 2015 an average of 61.8 million pounds of seafood from the Atlantic Ocean was landed, worth approximately \$31.4 million (\$24.9 when adjusted for inflation). The highest nominal value of landings was observed in 2004 at \$36.6 million, while the highest inflation adjusted value occurred in 2014 at \$30.2 million. The weight of commercial seafood landings from the Atlantic Ocean began to decrease significantly after 2004, eventually leveling off around 21.4 pounds from 2007-2015 (Figure 5).

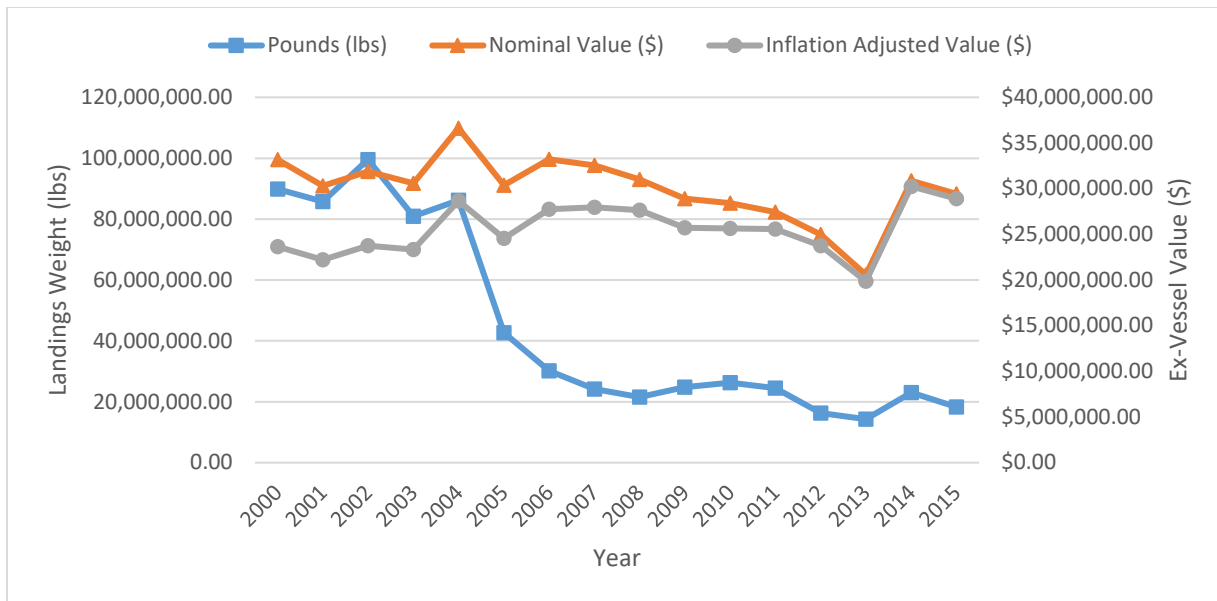


Figure 5. Commercial landings from the Atlantic Ocean (2000 to 2015).

King mackerel landings and value peaked between 2005 and 2006, after which they steadily declined before stabilizing around 2011. Between 2000-2015 an average of 837,823 pounds of king mackerel was landed in North Carolina worth approximately \$1.4 million (\$1.1 million when adjusted for inflation). The highest nominal and inflation adjusted values were seen in 2006 (\$2.1 million and \$1.8 million, respectively). The lowest nominal values and inflation adjusted values were seen in 2010 (\$643,793 and \$581,565, respectively) (Figure 6). King mackerel account for, on average, 4.5% of Atlantic Ocean landings.

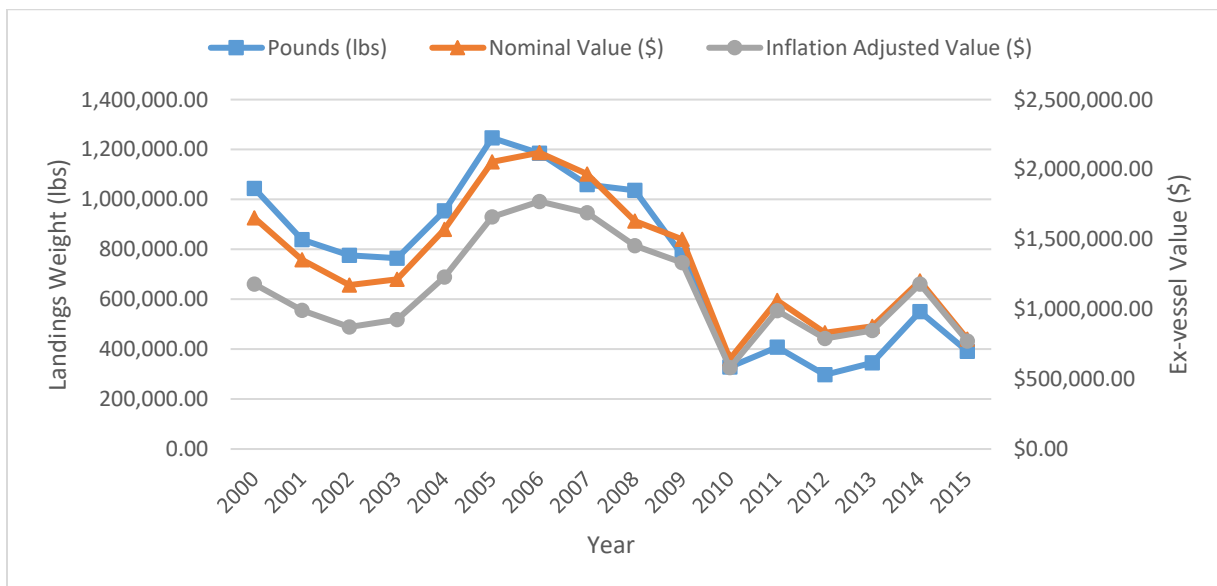


Figure 6. King Mackerel landings from the Atlantic Ocean (2000 to 2015).

Bluefin tuna landings and value have fluctuated between 2000 and 2015. Between 2000 and 2015 an average of 106,706 pounds were landed worth \$573,833 when adjusted for inflation. The peak occurred in 2004 with approximately 310 thousand pounds being landed worth a nominal value of \$1.97 million

dollars (\$1.55 when adjusted for inflation). The lowest landings occurred in 2011 (48,357 lbs. worth \$270,637), while the lowest nominal and adjusted values occurred in 2015 (\$200,380 and \$196,837, respectively). The largest landings and highest value occurred in 2004 with 310,298 pounds worth \$1.97 million dollars (1.55 million when adjusted for inflation) (Figure 7). Bluefin tuna accounts for, on average, 2.3% of Atlantic Ocean landings.

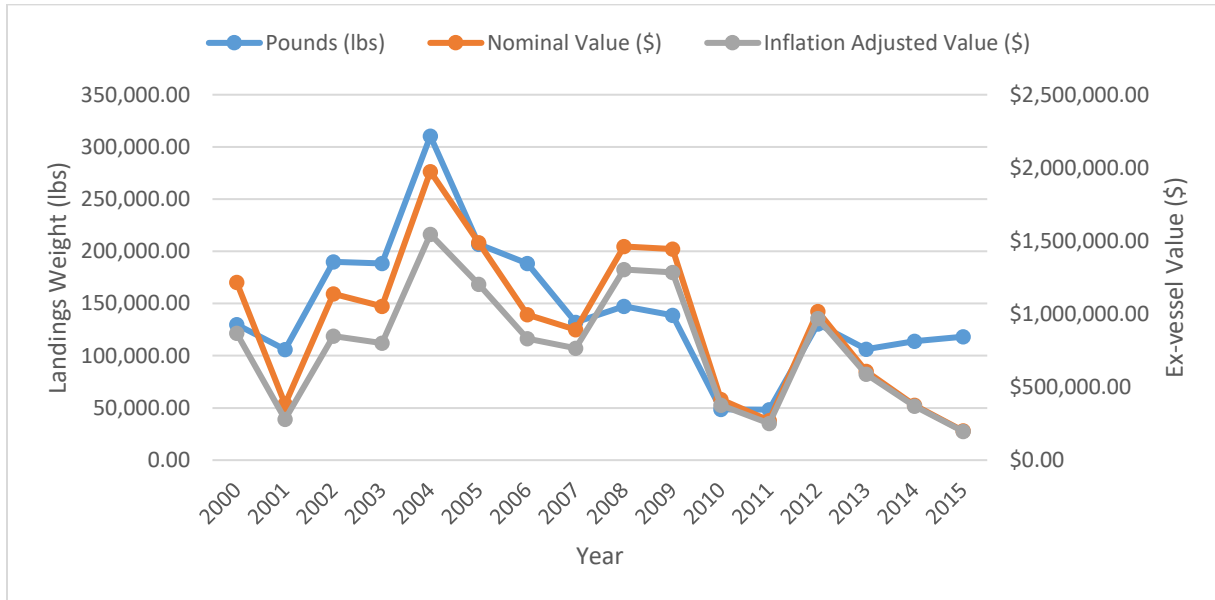


Figure 7. Bluefin Tuna landings from the Atlantic Ocean (2000 – 2015)

Snapper Grouper species are managed by the South Atlantic Fishery Management Council as a complex of related species (see: safmc.net for list of species). Catch of species from that complex was on the rise from 2000-2008 before decreasing down to 2011 levels where they have remained relatively constant. Landings and value peaked in 2008 with 2.85 million pounds being landed worth \$6.4 million dollars (\$5.71 when adjusted for inflation). Since 2011, landings have stabilized around 1.5 million pounds worth \$3.8 million dollars (Figure 8). Snapper Grouper species account for, on average, 14.2% of Atlantic Ocean landings.

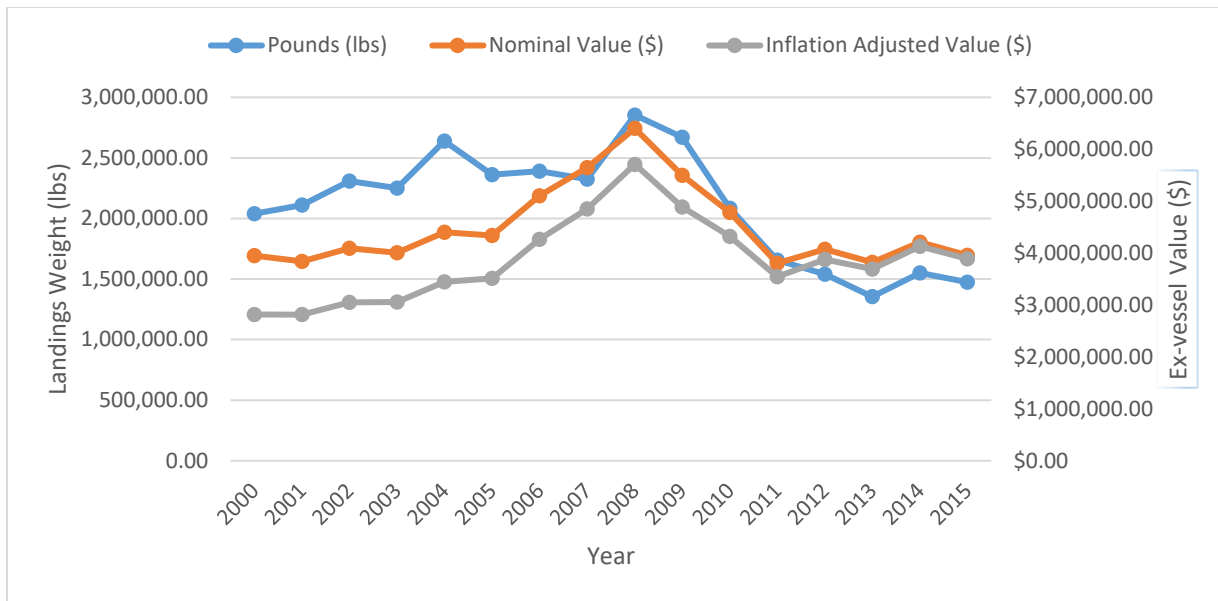


Figure 8. Snapper Grouper Complex landings from the Atlantic Ocean (2000-2015)

The number of Atlantic Ocean fishing trips has slowly decreased from 67,120 trips in 2000 to an average of 40,000 trips since 2012. The total value of Atlantic Ocean trips has followed a similar pattern, with an average \$636 landings value per trip (Figure 9).

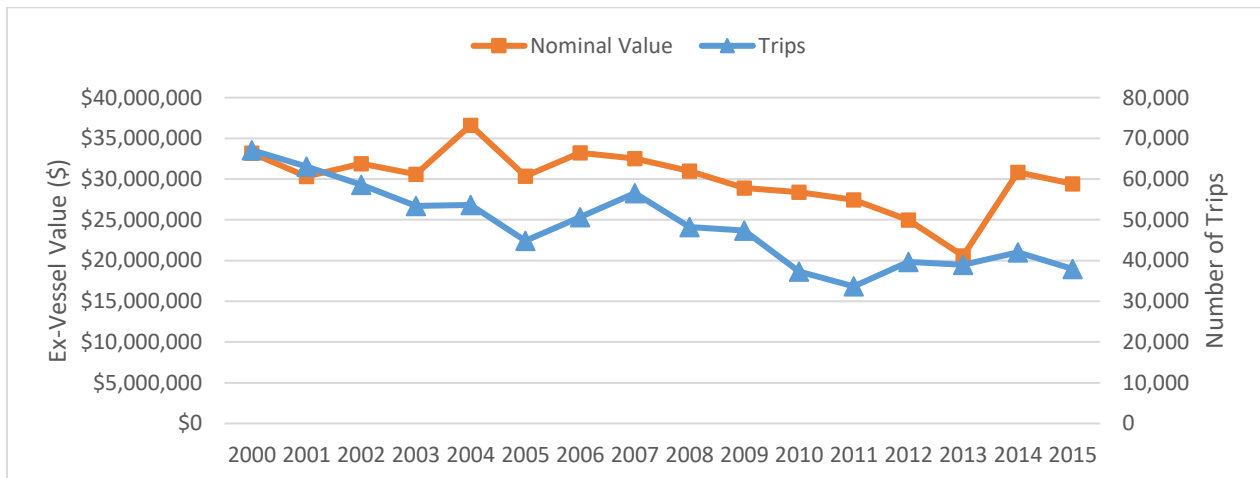


Figure 9. Number of trips and ex-vessel value of commercial landings in the Atlantic Ocean.

Economic Impacts

The economic activity associated with harvesting commercially valuable species in the EEZ off the coast of North Carolina is provided in Table 13. Commercial fishing in the Atlantic Ocean supported an estimated 1013 full-time and part-time jobs, \$14.8 million in income, and \$30.3 million in output impacts (Table X). The economic impacts from the commercial fishing-harvesting sector include a wide variety of businesses, such as those involved in selling petroleum products, boat building and repair, wholesale distribution services, food and beverage sales, real estate, banking, healthcare, and insurance.

Table 13. Economic Impact of commercial fishing in the Atlantic Ocean.

Total Pounds¹	Ex-Vessel Value¹	Jobs^{2,3}	Income Impacts (thousands of dollars)³	Output Impacts (thousands of dollars)³
8,572,090	\$22,273,981	1,013	\$14,678	\$35,286

¹As reported by the North Carolina Division of Marine Fisheries (NCDMF) trip ticket program.
²Represents the total number of full-time and part-time jobs combined.
³Economic impacts calculated using the NCDMF commercial fishing economic impact model and IMPLAN economic impact modeling software. All economic impact estimates are for the state economy of North Carolina.

The economic impact estimates presented for commercial fishing in the EEZ of the Atlantic Ocean should be viewed as conservatively low, as they solely represent the harvesting sector of the commercial industry. Other important components of the commercial fishing industry such as seafood distribution, wholesale, retail markets, and restaurants selling seafood harvested in North Carolina are not included in this analysis. Data are extremely limited specifically for these sectors in North Carolina. Furthermore, data on seafood supply chains regarding interstate and intrastate movement of North Carolina seafood products are highly limited due to few reporting requirements to track the movement of seafood and lack of adequate studies that provide data on such material. Efforts are currently under way to incorporate national level supply chain information with the state level data utilized by the NCDMF commercial fishing economic impact model to better estimate the full economic impact of the North Carolina commercial fishing industry. Economic impact estimates represent impacts to the state economy of North Carolina.

DISCUSSION

Many characteristics of Atlantic Ocean fisheries have remained relatively consistent since the last socioeconomic survey was conducted (Crosson 2009) including: demographics, seasonality, target species and gear and associated permits. However, some new trends have developed since the first Atlantic Ocean survey was conducted (Cheuvront and Neal 2004).

Atlantic Ocean fishermen have decreased their per trip and annual commercial fishing expenditures. In 2002, survey respondents indicated they were spending an average of \$303.49 per trip and \$23,042 annual. In 2007, respondents indicated spending substantially more, an average of \$1,785 per trip and \$95,560 annually. This survey indicated that fishermen have decreased their expenditures back down to \$2,194.95 (median \$225) per trip and \$45,840.24 annually (median \$9,835.5). This decrease trend could indicate that fishermen are exiting the fishery and investing less capital. 60% of respondents to the current survey considered themselves to be full time fishermen, however 60% of fishermen indicated having a secondary source of income, compared to 47% in 2007 and 60% in 2002. Two factors related to surveying may be influencing these results: first, the first Atlantic Ocean survey (Cheuvront and Neal 2004) focused solely on Snapper Grouper fishermen and thus the results do not reflect Atlantic Ocean fisheries as a whole. Second, the current survey was conducted during the summer months when more active fishermen are challenging to contact.

Related to changes in per trip and annual expenditures, commercial fishing income and household income for Atlantic Ocean fishermen has changed. In 2002, 11.3% of respondents indicated making more

than \$30,000 dollars from commercial fishing alone. In 2007, 20% of respondents indicated making more than \$30,000 dollars from commercial fishing alone. In 2015, 34% of respondents indicated making more than \$30,000 dollars from commercial fishing alone. Household income has followed a similar trend. In 2002, 36.6% of respondents indicated having a household income greater than \$50,000. In 2007, 53% of respondents indicated having a household income greater than \$50,000. And in 2015, 65% of respondents indicated having a household income greater than \$50,000. On the other hand, the income disparity remains large with 17% of current survey respondents indicating that they are breaking even or losing money from commercial fishing.

Finally, the perceptions fishermen have of management efforts and the current state of the Atlantic Ocean industry have changed. Changes in proclamations or changes in rules are become of greater concern for fishermen. This reflects increasingly complex regulations for Atlantic Ocean species, as well as complexity related the multiple management groups operating in Atlantic Ocean fisheries off the North Carolina coast including: The Mid-Atlantic Fishery Management Council, the South Atlantic Fishery Management Council, and the National Marine Fisheries Service. Atlantic Ocean fishermen are also reporting an increasing number of negative experiences with state and federal regulations as well as recreational fishermen, and other commercial fishermen.

While some trends seem optimistic, Atlantic Ocean commercial fishermen remain concerned about the future of their industry. With many respondents expressing concerns that increasing regulation was making commercial fishing too costly for it to be maintained as a full-time position without additional income. When asked if they would recommend commercial fishing to adolescents interested in the industry, majority indicated that they no longer felt comfortable encouraging commercial fishing as a career.

LITERATURE CITED

- Cheuvront, Brian. 2002. A Social and Economic Analysis of Commercial Fisheries of Core Sound, North Carolina. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Atlantic Coastal Fisheries Cooperative Management Act, National Oceanic and Atmospheric Administration Award No. NA87FG0367-3.
- Cheuvront, Brian. 2003. A Social and Economic Analysis of Commercial Fisheries in North Carolina: Beaufort Inlet to the South Carolina State Line. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. A Report for the NC Technical Assistance to the South Atlantic Fisheries Management Council, Task 5: NEPA Related Activities, Contract No. SA-03-03-NC.
- Cheuvront, Brian and Mary Neal. 2004. A Social and Economic Analysis of Snapper Grouper Complex Fisheries in North Carolina South of Cape Hatteras. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. A Report for the NC Technical Assistance to the South Atlantic Fisheries Management Council, Task 5: NEPA Related Activities, Contract No. SA-03-03-NC.
- Crosson, Scott. 2007a. A Social and Economic Analysis of Commercial Fisheries in North Carolina: Albemarle and Pamlico Sounds. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Conducted under the Fisheries Disaster Assistance Program, Section 312 of the Magnuson-Stevens Fisheries Conservation and Management Act, National Oceanic and Atmospheric Administration Award No. NA16FW1543.
- Crosson, Scott. 2007b. A Social and Economic Analysis of Commercial Fisheries in North Carolina: Core Sound. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Conducted under the Fisheries Disaster Assistance Program, Section 312 of the Magnuson-Stevens Fisheries Conservation and Management Act, National Oceanic and Atmospheric Administration Award No. NA16FW1543.
- Crosson, Scott. 2009. A Social and Economic Analysis of Commercial Fisheries in North Carolina: Atlantic Ocean. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Atlantic Coastal Fisheries Cooperative Management Act, National Oceanic and Atmospheric Administration Award No. NA05NMF4741003.
- Crosson, Scott. 2010. A Social and Economic Analysis of Commercial Fisheries in North Carolina: Beaufort Inlet to South Carolina State Line. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Atlantic Coastal Fisheries Cooperative Management Act, National Oceanic and Atmospheric Administration Award No. NA05NMF4741003.
- Diaby, Souleymane. 2000. An Economic Analysis of Commercial Fisheries in the Albemarle Sound Management Area, North Carolina. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Atlantic Coastal Fisheries Cooperative Management Act, National Oceanic and Atmospheric Administration Award No. NA87FG0367-1.
- Diaby, Souleymane. 2002. An Economic Analysis of Commercial Fisheries in the Pamlico Sound Area, North Carolina. NC Department of Environment and Natural Resources, Division of Marine

Fisheries, Morehead City, NC. Atlantic Coastal Fisheries Cooperative Management Act, National Oceanic and Atmospheric Administration Award No. NA87FG0367-2.

Hadley, J. & Wiegand, C. (2014). A Social and Economic Analysis of Commercial Fisheries in North Carolina: Albemarle and Pamlico Sounds. NC Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. Atlantic Coastal Fisheries Cooperative Management Act, National Oceanic and Atmospheric Administration Award No. NA08NMF4740476.

IMPLAN. 2009. Using IMPLAN V3: The IMPLAN V3 Modeling System. Stillwater, Minnesota.

SPSS (Statistical Package for the Social Sciences). 2002. release 12.0. SPSS, Inc. Chicago, IL.

APPENDIX A: 2016 Atlantic Ocean Commercial Fishing Survey

1. How many years have you been a commercial fisherman? _____
2. Compare yourself to other fishermen using a scale of 1 to 10. With 1 being “not at all successful as a commercial fisherman” to 10 being “no one has more success than I do”, how successful do you think you are? _____
3. Starting with January, what are the primary species that you target commercially and gears that you commonly use each month when fishing in the ocean?

Month	Species	Gears
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

4. Have you ever changed the species you target because of changes in regulations?

- No
- Yes

If “Yes”, record any comments (briefly) _____

FISHERY PARTICIPATION

5. What is the ownership type that best describes your fishing operation?

- Sole Owner
- Partnership
- Corporation

6. How many vessels do you own that are registered for use in your commercial fishing operation?

Fill this out starting with the vessel used most often.

Vessel	Years Owned	Estimated Market Value (including all gear)	Length (feet)	Crew Size*	Operator Status**
Vessel #1					1 2 3
Vessel #2					1 2 3
Vessel #3					1 2 3
Vessel #4					1 2 3

*Include the captain (minimum crew size for every vessel is 1)

**1.Captain/Owner 2.Hired Captain 3.Other

7. When fishing in the ocean, what percentage of your commercial fishing activity takes place in the waters off of North Carolina?

- Ocean waters off of North Carolina _____%
- Ocean waters off of other states _____%

8. Do you consider yourself to be a full time commercial fisherman?

- No
- Yes

9. What percentage of your total pre-tax individual income do you earn from commercial fishing (*that is, sale of fish taken with commercial fishing gear*)?

_____ %

10. What other kinds of work, if any, do you do to earn income other than commercial fishing?

11. Do you land fish commercially in any states other than North Carolina?

- No
- Yes
- If yes, please list other states:

OPERATING EXPENSES

12. Please provide the average operating expense per trip for an average ocean fishing trip in 2015 on the vessel that you use the most when fishing in the ocean. Round off your answers to the nearest dollar.

Expense Categories	Amount
Fuel and Oil	\$
Ice	\$
Groceries	\$
Bait	\$
Other	\$

13. Do you use a share system to pay the crew and captain of the vessel you use the most when you are fishing in the ocean?

- No
- Yes
- If no, then how do you pay the captain and crew? (Per day? Per trip?)
- If yes, what percentage of the net share (gross total revenues minus the expenses indicated above) goes to . . .
 - Boat's/Owner's share: _____ %
 - Captain's share: _____ %
 - Crew's share: _____ %

14. Total annual expenditures for 2015 for the vessel used most while fishing in the ocean.

Expense Category	Amount
Labor- Captain and Crew	\$
Vessel Loan Payments	\$
Vessel/Gear Repairs and Maintenance	\$
Docking Fees	\$
New Gear/Equipment	\$
Insurance	\$
Vessel Registration Fees	\$
State Commercial Fishing License and Permit Fees	\$
Federal Commercial Fishing Permit Fees	\$
Other Professional Expenses/Fees	\$

15. Which, if any, federal commercial fishing permits or endorsements do you own?

License/Permit/Endorsement Type	Market Value
	\$
	\$
	\$
	\$
	\$
	\$
	\$

16. Where do you keep the boat you use most often when you are fishing in the Ocean?

- When I fish in the ocean I'm on someone else's boat
- At my home
- A rented slip
- A slip not at my home, but I don't pay rent (e.g. at a fish house)
- Other place

17. Out of the following categories, please mark the amount that you earned last year just from commercial fishing. Include only pre-tax profit, that is, after you paid all expenses associated with your commercial fishing business.

- \$0 or lost money
- \$1 - \$5,000
- \$5,001 - \$15,000
- \$15,001 - \$30,000
- \$30,001 - \$50,000
- \$50,001 - \$75,000
- \$75,001 - \$100,000
- More than \$100,000
- Prefer not to answer

18. Over the past three years, do you feel as though the profitability of your commercial fishing business has increased, decreased, or remained about the same?

- Increased
- Decreased
- Remained about the same

DEMOGRAPHIC AND SOCIAL QUESTIONS

19. What is your age? _____

20. What is your gender?

- Male
- Female

21. What do you consider to be your ethnic background?

- Hispanic/Latino
- Asian-Pacific Islander
- White/Caucasian
- American Indian
- African-American/Black

22. What was the highest level of education that you have completed?

- Less than high school diploma
- High school diploma
- Some college/technical school
- College diploma (or more)

23. What is your marital status?

- Currently married
- Widowed
- Separated
- Divorced
- Never married

24. Do you have health insurance?

- No (If no, please skip to question 30)
- Yes (If yes, please answer questions 25-29 if applicable)

25. Is your health insurance provided by yourself, another job, a spouse's employer plan, Medicare/Medicaid, or another source?

- Self
- Other Job
- Spouse's Employer Plan
- Medicare/Medicaid
- Other (please briefly explain): _____

26. Does your plan cover on-the-water, commercial fishing related injuries?

- Yes
- No
- Do Not Know

27. How much are you paying in monthly premiums for your healthcare plan and how many people are covered by the plan?

- Monthly Premium: \$ _____
- Number of individuals covered: _____

28. If you purchase healthcare for yourself, was your healthcare plan purchased through a federal exchange such as healthcare.gov or through a private company or broker?

- Federal Exchange
- Private Company or Broker

29. If you purchased through a federal exchange, is your plan in the bronze, silver, gold or platinum category?

- Bronze
- Silver
- Gold
- Platinum
- Don't know

30. Has health insurance coverage effected your commercial fishing business? If so, please briefly explain?

31. How many people live in your household?

32. How many people in your family work in commercial fishing?
33. How many generations back have there been commercial fishermen in your family?
34. Out of the following categories, please mark the amount of the combined total income of everyone who lives in your household.
- Less than \$15,000
 - \$15,001 - \$30,000
 - \$30,001 - \$50,000
 - \$50,001 - \$75,000
 - \$75,001 - \$100,000
 - More than \$100,000
 - Prefer not to answer
35. What is the name of the community/town/city where you live?
36. Which county is that located in?
37. How many years have you lived in this community?

OPINIONS ABOUT COMMERCIAL FISHING

38. Do you think that you will be a commercial fisherman 10 years from now?
- Yes
 - No. Please briefly explain why:
39. Using a scale of 1 to 10, with 1 being “do not agree at all” to 10 being “extremely agree” tell me how much you agree or disagree with each of the following statements.
- _____ I believe I will be able to make a living in fishing in the future.
- _____ My health is affected by my fishing.
- _____ Commercial fishing is important economically in my community.
- _____ Commercial fishing has an important role in the history of my community.
- _____ Commercial fishermen are respected in my community.
- _____ My community actively supports commercial fishing.
- _____ I have to work harder now to land the same amount of fish that I did a few years ago. (If you think there is no difference, your answer should be 5.)
40. Approximately how many hours per month do you typically spend on record keeping for your commercial fishing business to meet federal and state commercial fishing requirements (logbooks, vessel trip reports, trip tickets, etc.)?
- Hours spent on federally mandated commercial fishing record keeping? _____

- Hours spent on state mandated commercial fishing record keeping? _____

41. Have you had any trouble finding a buyer to sell your catch to?

- No
- Yes

42. Do you have a seafood dealer license?

- No
- Yes

43. Do you have a business relationship with a specific seafood dealer or are you independent?

- I am a seafood dealer and sell my own catch
- Independent (sells to whomever I wish)
- Relationship with a specific seafood dealer or dealers

If you have a relationship with a specific dealer, please answer the following three questions (44-46):

44. Does the dealer provide you with docking space?

- No
- Yes

45. Will the dealer give you an advance for bait or other necessities?

- No
- Yes

46. Does the dealer provide you with credit or loans?

- No
- Yes

47. Are you a member of any commercial fishing organizations?

- No
- Yes (NCFA, NCWU, etc.)

48. In the last year, have you had any negative experiences with the following:

- With other commercial fishermen

- No
- Yes

- With recreational fishermen
 - No
 - Yes

- Involving federal regulations
 - No
 - Yes

- Involving state regulations
 - No
 - Yes

49. Use the scale of 1 to 10 and tell me how important you consider each of these issues to your commercial fishing business. 1 means “it’s not important or doesn’t affect my business” and 10 means “it is extremely important, or it affects my business a great deal”.

- _____ Overfishing
- _____ Competition with local commercial fishermen
- _____ Competition with non-local commercial fishermen
- _____ Competition with recreational fishermen
- _____ Endangered species regulations
- _____ Keeping up with proclamations or changes in rules
- _____ Gear Restrictions
- _____ Seasonal or area closures
- _____ Trip limits
- _____ Size limits
- _____ Quotas
- _____ Federal regulations
- _____ State regulations
- _____ Seafood prices
- _____ Competition from imported seafood
- _____ Obtaining financing for repair/replacement costs
- _____ Cost of commercial fishing licensing, permits, or endorsements
- _____ Record keeping (trip tickets, log books, etc.)
- _____ Crew or labor issues
- _____ Weather
- _____ Predicting the future for your commercial fishing business
- _____ Fuel prices
- _____ Losing working waterfronts like docks, marinas, and fish houses
- _____ Development of the coast
- _____ Illegal sale of fish

50. Use a scale of 1 to 10 again. This time the scale ranges from 1 meaning “not at all likely” to 10 meaning “extremely likely”. If a young person came to you and said they wanted to be a commercial fisherman, how likely is it that you would recommend being a commercial fisherman?

51. Would you like a copy of the final report for this survey once it has been completed and all results compiled? If “Yes”, an email address must be provided below.

No

Yes: Please provide email address to receive the final report:

52. Any additional comments?