Lasting Impacts of Hurricanes on North Carolina's Commercial Fishermen – Follow Up Survey

By

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Above all I wish to thank the fishermen who took the time to participate in the survey and tell us their stories. I never cease to be amazed by their ingenuity and resilience.

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"*Hurricanes change things. They can make you, break you, whatever. They will move the fish up and down the coast. They can devastate an area, or be a good clean up of the bottom and also get rid of pollution. What one will do is anybody's guess.*" – Survey Participant

Hurricanes Dennis, Floyd, and Irene impacted North Carolina during late August through October 1999. Dennis affected the immediate coastal area for several days in late August through early September, with heavy surf, erosion, and prolonged high tides. Hurricane Floyd's winds and rain inflicted severe damage from the coast well into the Piedmont region of North Carolina in mid-September. In many areas rainfall totaled 20 to more than 30 inches. Irene brushed the coast with minimal effects in October.

Average annual rainfall for most of eastern North Carolina is about 50 inches. Hurricane Dennis was probably more devastating of the three storms to coastal communities and marine fisheries. That storm stalled off the coast of North Carolina for a week before making landfall as a tropical storm over Cape Lookout and tracking roughly northwest up the Neuse River. Figure 1 shows the tracks of the 1999 North Carolina hurricanes.

The present follow-up study was conducted to determine the efficacy of the hurricane disaster relief program of 1999 – 2000 in terms of meeting the needs of North Carolina's commercial fishermen and to determine the lasting impacts of the hurricanes on the economic viability of the fishermen.

Extreme flooding from Hurricane Floyd lasted several weeks and occurred in all the coastal river basins, except the Lumber Basin. This single hurricane caused 52 fatalities in North Carolina, the most from any hurricane in the United States since 1972. At the time, the estimated damage caused by the storm in North Carolina was about $6 billion, making Hurricane Floyd the third most costly hurricane in the nation's history (Bales et al. 2000)

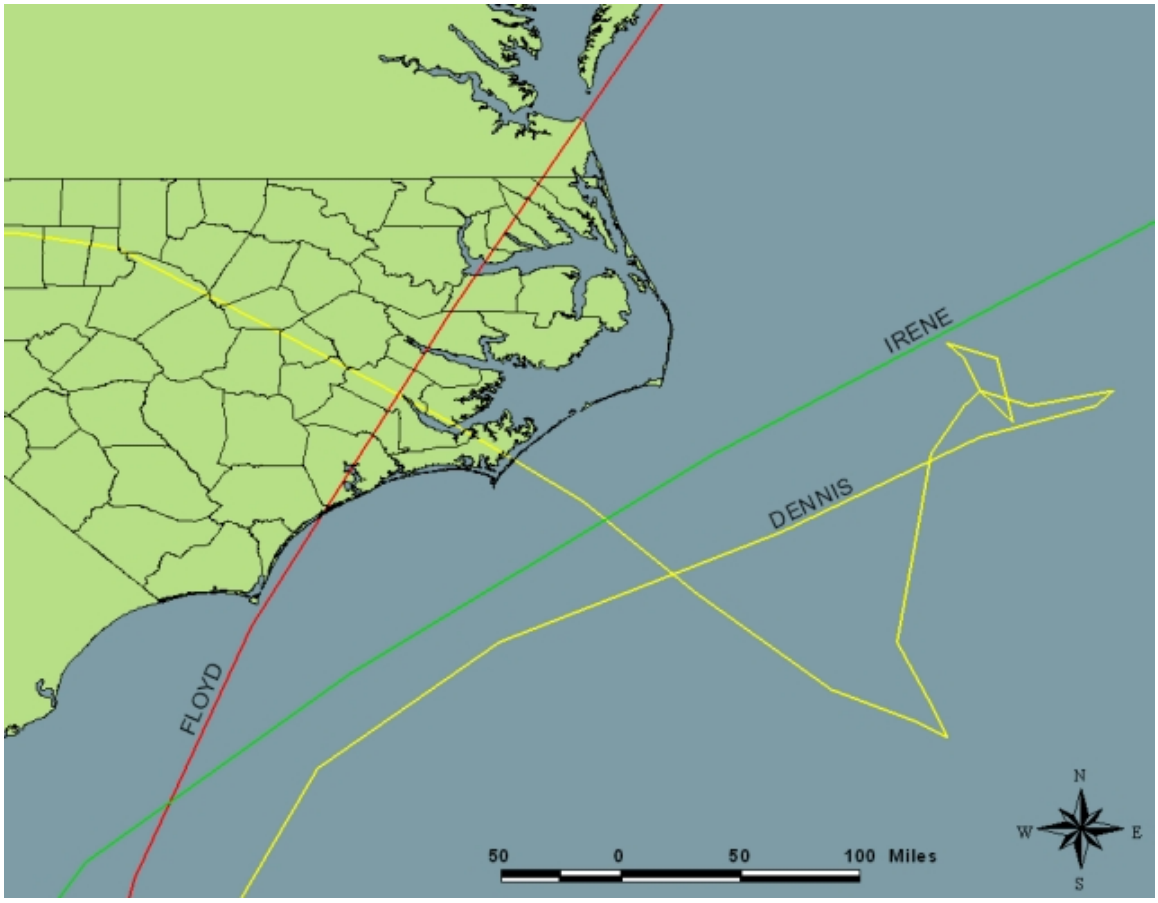

Figure 1. Tracks of the 1999 Hurricanes off the NC Coast

North Carolina's fishing industry suffered extensive damage from the hurricane and floods. Fishing gear, vessels, and shore side structures were damaged and lost. Many of the approximately 5,000 active commercial fishermen could not fish for periods ranging from days to months. Infrastructure supporting both commercial and recreational fishing was damaged and destroyed. The Federal Emergency Management Agency (FEMA) along with numerous private groups and local agencies mounted relief efforts to meet immediate support needs. These efforts helped the thousands of affected individuals and communities begin the long road to recovery.

In December 1999, the North Carolina General Assembly met in emergency session to develop a comprehensive state-funded disaster relief program. All state relief programs were included in the Hurricane Floyd Recovery Act of 1999, covering areas such as housing, business, farming, local

government, and commercial fishing. The North Carolina Division of Marine Fisheries (NC DMF) worked with the seafood industry to determine storm impacts and provided the information to the General Assembly. Of the total $836,658,000 provided by the Act, $11,400,000, or 1.4% of the total, was provided “to commercial fishermen to compensate for equipment losses and reduction in harvests” (House Bill 2 ratified bill, North Carolina General Assembly, 1999 extra session). These funds were provided to the Department of Environment and Natural Resources (DENR), which designated the DMF as the responsible agency (Street and Williams 2001). Later, $3,729,013 was reallocated it for other storm-related activities, leaving a total of $7,670,987 for grants and program operations.

The relief funds were distributed in two phases. The amount of the grants was set at 60% of approved losses as long as funds were available. The NC DMF trip ticket program was used to determine amount of fishing income losses. Only participants in those fisheries that had at least a 33% decline in landings during September and October 1999, compared to the average landings from those fisheries in the same months in 1997 and 1998, were eligible to apply. Additionally, to receive compensation for lost gear, the fishermen needed to demonstrate a loss of at least $500 in fishing income. Applicants were required to have had an overall 25% reduction in their overall fishing income, as well as at least a 25% income loss in at least one of the affected fisheries.

A second round of relief grants used remaining funds after the completion of Phase I payments. Phase II applicants followed the same rules as Phase I, except the $500 income loss threshold for gear loss eligibility was deleted. Also, loss of seed oysters and clams was included in the program for licensees holding shellfish leases.

Method

A total of 983 commercial fishermen out of 1,207 total applicants to the state relief program received compensation for income/equipment/vessel/shell

stock losses attributable to Hurricane Floyd. In 2004, a random sample of 350 of those who received payments was selected to participate in the follow up survey.

A few weeks before the fishermen were contacted about participating in the survey, a letter (Appendix A) was sent explaining that someone from NC DMF would be calling about the survey and explaining why it was important for them to participate.

The survey was designed to ask the fishermen about their losses from Hurricane Floyd and what they did to recover from the storm, such as buying new gear, repairing old gear, non-fishing related losses (such as damage to their home and other personal property), and their estimate of how much income they lost overall as a result of the storm.

The fishermen were also asked whether they were still fishing commercially. If they were not still fishing, they were asked why they were no longer fishing. If the fishermen were still fishing, they were asked whether their fishing business has changed as a result of the hurricanes of 1999. If they indicated they had changed any aspects of their fishing business, they were asked for reasons why they might have changed their fishing practices. Finally, the fishermen were asked for their opinions on what they felt were the long-term impacts of hurricanes on commercial fishing. A copy of this survey is in Appendix B.

Telephone calls began about a week after the letter was sent, and were made repeatedly until the person answered the survey questions, told us they did not want to participate, another member of the household told us the person did not want to or could not participate, or it was determined that we were unable to locate the fisherman. In those instances when a number was found to be incorrect or out of service, a new or alternate telephone number was sought through the NC DMF's Fisheries Information Network license database and through Internet online searches. The research assistant ended attempted contacts only after all the previous steps were completed.

Results

Of the 350 grant recipients selected to participate in the study, we were unable to locate 103 (29%). There were eight instances where we were able to locate someone who knew the grant recipient, but the contact person reported that the original recipient was deceased. Three recipients were determined to be ineligible because they could not speak English well enough to answer the survey questions. In each these cases, the primary language of the grant recipient was Vietnamese. Of the remaining 244 grant recipients, one refused to participate, and one was a "passive refuser". He never said he would not participate, but he actively avoided speaking to the interviewer. A total of 242 grant recipients who participated in the survey, for a completion rate of 99%, considering only those potential participants who we were able to reach by telephone, were eligible to participate, and did not refuse to answer the questions.

Many fishermen have more than one type of North Carolina commercial fishing license. Ninety-five percent of all the survey participants were holders of at least one Standard Commercial Fishing License (SCFL) in the fall of 1999 (Table 1). Just under two percent had a Retired Standard Commercial Fishing License (RSCFL). Three percent had a Shellfish License Without at SCFL. Slightly more than 23% had a Fish Dealer License in addition to the SCFL.

Table 1. Types of North Carolina commercial fishing licenses held in 1999.

License Type	Percent (n=242)
SCFL	95.0%
RSCFL	1.7%
Shellfish	3.0%
Dealer	23.1%
Other	3.7%

At the time of the survey, 5.4% of the respondents said they did not have any North Carolina commercial fishing license. However, 12% stated they were

no longer fishing commercially. The discrepancy between those not fishing, but still holding licenses can be explained by the fact there are limited SCFL fishing licenses available. Some fishermen may annually renew these licenses hoping to return to commercial fishing at some point in the future, but not actively engaging in commercial fishing. Additionally, many of these licenses are sold in the open market; hence, some former fishermen renew licenses as a financial investment. Others keep the licenses active to be able to pass them on to another person. Some may occasionally use their license but do not sell their catches, because holding a SCFL allows the fisherman to land catches in commercial quantities, rather than adhering to recreational limits.

The 229 respondents who had at least one North Carolina commercial fishing license were asked to state which types they had (Table 2). The percentages of respondents holding the different licenses was nearly identical to percentages prior to the hurricanes of 1999.

Table 2. Types of North Carolina commercial fishing licenses held when interviewed.

License Type	Percent (n=242)
SCFL	95.2%
RSCFL	1.7%
Shellfish	3.5%
Dealer	21.8%
Other	0.4%

Fishing-related losses. Most of the survey respondents (78.1%) said they had to replace fishing gear as a result of the hurricanes of 1999. All manner of gear had been lost by the participants, but losses consisted primarily of pots, gill nets, pound net sets, or parts of these gears such as buoys. Thirty-one percent of the fishermen reported having had damage to their boats or fishing business property. Electronics and other boat gear were listed most frequently. Many boats were damaged after breaking away from their moorings and running aground. Also, some boats were damaged by debris striking or falling on them. There were also damage reports on docks and fishing gear storage buildings.

Nearly all of the fishermen (99.6%) reported lost income as a result of the hurricanes. Fishermen who said they lost income reported losing between $700 and $120,000, with average losses of $11,449. Fishermen said the aid program covered an average of 38.1% of their fishing losses. The values given by the survey respondents were not based on the decision criteria used to disburse the money, but based on the fishermen's perceptions of their fishing-related losses. Two surveyed fishermen said the amount of money they received exceeded their losses. Table 3 shows a summary by categories of percent of losses covered.

Table 3. Percent of total losses covered by the economic assistance.

% of Losses Covered	Percent (n=242)
Less than 10%	11.8%
10% to 24.9%	23.1%
25% to 49.9%	34.9%
50% to 74.9%	16.4%
75% to 99.9%	8.4%
100% or more	5.5%

Other losses. Many fishermen sustained impacts from the hurricanes that may not have been directly related to their fishing business. Many fishermen live in low-lying homes near or on the water and sustained significant damage. The primary sources of damage were flooding, high winds, and objects such as trees falling on cars and houses. Approximately 25% of the respondents reported damages to personal property not related to their fishing business. The range of these losses was reported to be between a few hundred dollars upwards to $200,000.

Current fisheries employment. The majority (88%) of survey respondents who were fishing prior the hurricanes were still involved in commercial fishing. However, nearly a third (31.9%) of the people still fishing at the time of the survey said they are fishing less than they did prior to the hurricanes of 1999. Yet, 22.5% said they were fishing more now than they were in 1999. The remaining 45.5% of the fishermen are spending the same amount of time in commercial fisheries as they did in 1999.

Of the 68 fishermen who said they were fishing less at the time of the interview compared to before the hurricanes of 1999, 33.8% said they were fishing less because there are not enough fish for them to catch. Some (23.5%) said they were fishing less because of low prices received by fishermen for their catch. Declining health or advancing age was cited as a reason for fishing less by 22.1%. Regulations restricting fishing activities were mentioned by 16.2%. Too many people fishing commercially was listed by 8.8%. Imported seafood was specifically mentioned by 7.4%. Other fishermen counted the additional impacts of Hurricane Isabel in 2003 as a reason they were not currently fishing as much as before. Fishermen who were fishing less frequently mentioned that because of these impacts, they had to seek a greater part of their income from shore-based work.

None of the fishermen who left fishing stopped fishing in 1999. About 12% of those interviewed are no longer active in commercial fishing. Table 4 shows what percent of them stopped fishing in the years from 2000 to 2003.

Table 4. Rates of leaving by year for those who left commercial fishing.

Year	Percent (n=29)
2000	10.3%
2001	20.7%
2002	41.4%
2003	27.6%

Nearly 45% of the respondents who left fishing did not consider the hurricanes of 1999 to be a factor in their leaving commercial fishing. However, 27.6% of those who left felt Hurricane Floyd was the major reason why they stopped fishing. An additional 17.2% felt the hurricanes had a lot of influence on why they left commercial fishing. Table 5 shows the influence hurricanes had on survey respondents' decision to leave commercial fishing.

The fishermen who had left commercial fishing altogether were asked about reasons, in addition to hurricanes, that influenced their decision to stop fishing. Regulatory actions making it harder for them to fish, was given as a

primary reason by 87.5% of the fishermen who were no longer fishing. Age or health was a factor in the decision to leave by 84.6% of the fishermen. This was followed by low prices paid to fishermen for their catch (80%), not enough fish available to make fishing profitable (77.8%), too many

Table 5. Influence of hurricanes on the decision to leave commercial fishing.

people are fishing (71.4%), and 60% said competition from imported seafood were factors in their decision to stop fishing.

Amount of Influence	Percent (n=29)
Not at all	44.8%
A little	6.9%
A lot	17.2%
The main reason	27.6%
Not sure	3.4%

Fishing practices. Successful commercial fishermen from North Carolina have always had to be adaptable and change their fishing practices as conditions warrant. Typically, that means fishing for more than one species or using more than one gear in order to make sufficient income in a given year. It was noted in this survey that fishermen also need to be adaptive on a longer range scale, as well, to remain viable. Among those who were still fishing at the time of the survey, 26.3% reported they have had to change species they target since 1999. An additional 24.9% have changed the gears they now use, and 16% are now fishing in other water bodies. Most fishermen who changed species, gears, or water bodies did so to make up for their income lost from the fisheries they used to participate in. Some said they stopped their previous practices because another fishery, gear, or water body became more profitable. Very few reported changing as a direct result of the hurricanes of 1999.

Discussion

The hurricanes of 1999 had devastating effects on many people in North Carolina. The most prominent impacts are those to personal property, primarily

loss of homes as shown in the media. The hurricanes of 1999 indeed had a major impact on homes – between 50,000 and 55,000 were impacted (Maiolo et al. 2001). Additionally, the North Carolina economic impacts were estimated at $6 billion, with a loss of 30,000 jobs.

Commercial fishing is an industry in North Carolina that took a particularly hard hit from the hurricanes. Impacts to fishermen can be measured in relation to short-term and long-term effects, personal losses, and business-related impacts. Yet all fishermen did not feel the impacts to the same degree. The severity of the impacts seemed primarily to depend on the fisheries in which the fisherman participates, gears used, and water bodies fished.

This survey only followed up with those fishermen who received assistance from the state. Fishermen who did not receive state financial assistance were not eligible to participate in the survey. These fishermen either did not apply, had their losses covered by private insurance, or did not suffer losses that qualified them to receive aid.

As part of the interviews, many fishermen told stories of their personal losses – damage to homes, cars, and property from wind, debris, and flooding. Nearly all of the fishermen interviewed suffered short-term income losses. Some material business losses were relatively short-term, because some were able to replace lost gear relatively quickly. However, some fishermen never were able to recover from those losses.

In addition to the immediate loss of fishing gear caused by the storm, such as boats and docks, some fishermen lost the ability to work for an extended period due to changes in stock availability. Many fishermen described the movement of species from their normal habitats as a result of water quality changes or habitat destruction. Several thought their targeted species had been pushed out to sea by the huge volume of water dropped by Hurricane Floyd. A few fishermen felt their targeted species still had not recovered in their preferred fishing areas to their pre-hurricane levels.

In at least one instance the stock-related losses felt by some fishermen were actually a short-term gain by others. Freshwater from Hurricane Floyd's

rains flushed crabs down the Pamlico and Neuse rivers into its mouth where it empties into Pamlico Sound (NC DMF 2004). For a period after the storm, crab landings from this area were much higher than average. However, this boon was a short-lived one. Many fishermen stated in the years following Hurricane Floyd crabs became scarce and they had to travel farther from their usual fishing grounds to catch the crabs (see also, Eggleston et al. 2004).

While all fishermen felt hurricanes have at least some impact in the short term, there are disparate views about the long-term impacts of hurricanes on their business. Said one fisherman regarding short-term effects, “Hurricanes are a big strain on us. We lose equipment and have to figure out how to replace it. After Floyd we got aid, but we had to spend that on bills over the winter due to loss of income. Crabbing fell off in the sound for three weeks after the hurricanes, which meant five weeks of lost income. And then the fish were gone [later in the fall]. It appeared to have no impact on oyster dredging.”

Some fishermen said they experienced negative long-term effects from hurricanes. “Normally hurricanes have a negative effect every time. I never see anything good come of them. The year after the hurricane, I caught no shrimp. It washed them out to sea.”

Several fishermen said hurricanes “really have no long-term effects.” “They do clean things up,” said one fisherman, “but they also create a lot of silt and pollution. All the fresh water from the rain holds things farther down the sounds. That usually only lasts for one or two months.”

Aquaculturists and pound net fishermen in the central and southern parts of the state said they were especially hard hit. Shellfish lease holders suffered economic losses after having invested in shellfish seed and other materials they never were able to harvest. Some shellfish beds were covered by additional sand or destroyed by the heavy water action. “I planted seed clams on a lease on a Monday and the hurricane came through on a Thursday so they all washed away”, said one fisherman. Many pound net fishermen said they lost their sets, because they did not have enough time to take up their gear once it was clear the storms were headed for the North Carolina coast. Fishing time was lost after

the storm by those who were able to retrieve their nets because setting up a pound net is very time-consuming, lasting at least several days.

One fisherman said he believes the hurricanes are good for commercial fisheries. “The hurricanes do us some good in the long run”, he said. “The water was very polluted but the hurricanes cleaned out the pollution. I've had to wait for the cleanup and now the crabs are back. So I'm going to go back into it when I get my new boat rigged up.” A few stated that hurricanes are all part of the natural cycle of the oceans.

All of the fishermen interviewed in the survey felt significant negative impacts from the hurricanes of 1999. Most managed to survive and stay in business, but in spite of the aid received, 12% left fishing altogether. Of those still fishing, 28% were less engaged in commercial fishing activities than they were prior to the 1999 hurricanes. Not all of the commercial fishermen attributed their reduced fishing activity primarily to the hurricane, but many believe it was a contributor. Many people involved in commercial fishing said their livelihood and way of life is also threatened as a result of pollution, imports, competition for resources, and regulatory actions. To them, a devastating hurricane is just one more problem to add to that list.

References

Bales, J.D., C.J. Oblinger, and A. H. Sallenger, Jr. 2000. Two months of flooding in eastern North Carolina, September – October 1999: hydrologic, water quality, and geologic effects of hurricanes Dennis, Floyd, and Irene. USGS – WRIR – 00-4093, 47p.

Eggleston, D.B., E.G. Johnson, and J.E. Hightower 2004. Draft – Population Dynamics and Stock Assessment of the Blue Crab in North Carolina. Draft Final Report of t North Carolina State University to the North Carolina Division of Marine Fisheries, Morehead City, NC.

Maiolo, J.R., J.C. Whitehead, M. McGee, L. King, J. Johnson, H. Stone (eds.) 2001. Facing Our Future: Hurricane Floyd and Recovery in the Coastal Plain. Greenville, NC: Coastal Carolina Press.

NC DMF 2004. North Carolina Fishery Management Plan – Blue Crab. NC DENR, DMF, Morehead City, Draft 3, 340p.

Street, M.W. and A. L. Williams 2001. Hurricane Floyd Commercial Fishermen's Relief Grant Program – Final Report. NC DENR, DMF, Morehead City. Unpublished report, 49p.

Appendix A: Letter to Fishermen

North Carolina Department of Environment and Natural Resources
Division of Marine Fisheries

Michael F. Easley, Governor William G. Ross Jr., Secretary

Dear

Our records show that you received economic assistance after Hurricane Floyd through the NC Division of Marine Fisheries (NC DMF). One goal of that program was helping offset losses suffered by commercial fishermen following the hurricane.

Currently, the NC DMF is conducting a survey to learn whether or not people were actually helped by economic assistance they received. You were randomly chosen to participate in this survey. Not everyone who received assistance from the program will be asked to participate in this survey.

You may be assured of complete confidentiality. Your answers to the questions will be combined with the answers of all the others who participate. At no time will your name ever be associated with any of your individual answers.

The answers from everyone who participates in the survey will be combined in a written report and made available to anyone interested in the survey results.

You will be contacted after January 1, 2004 by an interviewer who works for NC DMF. This person will have the complete details about your participation. However, as the person in charge, I will always be most happy to answer any questions you may have. My telephone number is (252) 726-7021 ext. 603, or toll free (800) 682-2632.

Thank you for your assistance.

Sincerely,

Brian Cheuvront, Ph.D.
Socioeconomics Program Director
NC Division of Marine Fisheries

Appendix B: Fisherman Survey

Study ID _____

The NC Division of Marine Fisheries is trying to determine how fishermen and their businesses are impacted by hurricanes. We are also interested in knowing how helpful the state money you received was in recovering from Hurricanes Dennis & Floyd losses.

1. In Fall 1999, what DMF licenses did you hold? (check all that apply)
   - □ Shellfish License
   - □ Retired Standard Commercial Fishing License (RSCFL)
   - □ Standard Commercial Fishing License (SCFL)
   - □ Fish Dealer's License
   - □ Other licenses _____
     (please specify)

2. What DMF licenses do you currently hold? (check all that apply)
   - □ No current DMF fishing licenses
   - □ Shellfish License
   - □ Retired Standard Commercial Fishing License (RSCFL)
   - □ Standard Commercial Fishing License (SCFL)
   - □ Fish Dealer's License
   - □ Other licenses _____
     (please specify)

Questions 3 – 10 refer to the period right after the hurricanes in Sept. 1999…

3. Did you replace fishing gear that was lost or damaged by the storm?
   □ No □ Yes *(if yes, ask question 4, else skip to question 5)*

4. What gear did you buy? _____

5. Did you repair/replace a boat or other property because of storm damage?
   □ No □ Yes *(if yes, ask question 6, else skip to question 7)*

6. What did you repair/replace? _____

7. Did you lose income because you were not able to work after the storms?
   □ No □ Yes *(if yes, ask question 8, else skip to question 9)*

8. How much income did you lose because of the storm? $_____.00

9. What other expenses or losses did you have as a result of the 1999 hurricanes? (Include fishing and non-fishing losses, such as home damage)

   _____

10. What percent of your total fishing-related losses were covered by the state money you received through Marine Fisheries?

_____%

11. Are you still working in commercial fisheries?

□ No □ Yes

If not in commercial fishing any longer…

12. When did you stop working in commercial fishing?

_____ (YYYYMM)

13. How much of an impact have hurricanes, made on your decision to leave commercial fisheries?

□ Not at all □ A little □ A lot □ The main impact □ Not sure

Comments _____

_____

14. What are some other reasons why you have left commercial fishing?

□ Too old/retired/health reasons
□ Too much regulation
□ Not enough fish
□ Too many people fishing
□ Low prices for seafood
□ Foreign imports
□ Other reasons _____
(Specify other reasons)

If still fishing *(ask questions 15 – 19 as appropriate)*

15. Are you spending more, less, or about the same amount of time in commercial fisheries now than you spent in 1999?

□ less time □ about the same time □ more time

If spending less time in commercial fishing

16. Why are you spending less time working in commercial fishing since the hurricanes in 1999?

□ Too old/retired/health reasons
□ Too much regulation
□ Not enough fish
□ Too many people fishing
□ Low prices for seafood
□ Foreign imports
□ Other reasons _____
(Specify other reasons)

Since Hurricanes Dennis & Floyd, have you…

17. Changed the species you target/buy/sell?

□ No □ Yes

Comments _____

_____

_____

(If the respondent is a commercial fisherman, ask questions 18 & 19.)

18. Changed the gears you use?

□ No □ Yes

Comments _____

_____

_____

19. Do you fish in different water bodies now than you did before the hurricanes in 1999?

□ No □ Yes

Comments _____

_____

_____

<u>Ask the following questions of all respondents.</u>

20. How many years have you been *(were you)* in commercial fishing? _____

21. What do you think are the long-term impacts of hurricanes on commercial fishing?