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FEEDBACK FROM THE FIELD

Estimation of Financial Losses to Alabama's Seafood Industry Due to Hurricane Katrina*

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Hurricane Katrina impacted the coastal areas in the states of Alabama, Mississippi and Louisiana, U.S.A. on 29 August 2005. This study estimated economic loss to Alabama's seafood industry from Katrina's devastation. For loss estimation, the Alabama seafood industry was divided into four categories: dealers and processors, shrimp fishermen, other fishermen, and charter boat owners and/or operators. Estimated losses were calculated separately for damages to boats and facilities (excluding insurance coverage), beached vessels, lost inventories, wages and invoices unpaid, and lost revenues from past and future lost sales. Loss estimation was based on broad guidelines suggested by the U.S. National Academy of Sciences for impact estimation from natural disasters and the U.S. OMB Circular A-94. Losses to Alabama's seafood industry were estimated at $122.25 million with a possible additional loss of $61.1 million due to defaulted loans.

Hurricane Katrina made landfall in the states of Louisiana and Mississippi, U.S.A 29

August 2005. In addition to damages from wind, high storm surges literally wiped out many communities from Louisiana to Alabama. Due to its geographic proximity and concentration on the coastline, the Gulf Coast seafood industry was severely impacted. The damage inflicted on the seafood industry in Alabama, Mississippi and Louisiana caught the attention of the national media (Stoller and Woodyard 2005; Copeland 2005). Damages and losses were experienced by all coastal areas in Alabama with significant concentrations in Bayou La Batre and the surrounding areas where storm surge reached 18 feet flooding/destroying shoreline buildings and businesses. Bayou La Batre, according to 2000 U.S. Census data, had a population of 2,313 with a poverty rate nearly twice the national rate at 22.9 percent. The 1999 median household income in this area was $24,539. Research indicates that natural disasters create winners and losers (Scanlon 1988; Chang 1984). At least in the short run, however, small areas like Bayou La Batre appear to be more losers than winners.

The primary objective of this study was to estimate economic damages and losses to Alabama's seafood industry, including the charter boat industry, caused by Hurricane Katrina and, to a lesser extent, Hurricane Rita. Chang et al. (2006) estimated economic losses for Alabama's fishery sectors. This paper is the summary of a report prepared for the Alabama Marine Resources Division (Chang et al. 2006) and presented to the U.S. Congress by the National Marine Fisheries Service as part of the damage assessment of the Gulf Coast seafood industry. This paper provides a methodological framework for assessing initial damages to fishing communities due to a major hurricane.

The Model

Damages from natural disasters are difficult to identify; Handmer (2002) describes many of these difficulties. For this study the authors chose to follow broad guidelines for estimating damages resulting from natural disasters as outlined by the National Academy of Sciences (NAS 1999). In these guidelines, the NAS determined loss caused by a disaster is a broader concept than the cost, a term referring to the losses typically reimbursed by insurance companies and governments. The NAS further defines losses from disasters as the combination of 1) direct losses resulting from the destruction of physical items such as buildings and natural resources and 2) indirect losses representing outcomes of the destruction such as job loss and suspension of business activities. As in the NAS guidelines, this report included any affected entity regardless of whether or not those who received losses were insured or qualified for government financial aid (NAS 1999).

Typically the "multiplier effect" is included in economic impact valuations. However, the NAS does not require the inclusion or exclusion of the multiplier effect for estimating losses from natural disasters (NAS 1999). Being such a small area, the multiplier effect in the study area is likely very small. Considering the assumptions of the multiplier effect within the affected area, in conjunction with the Office of Budget and Management's Circular A-94 prohibiting the inclusion of the multiplier effect for impact estimation (Chang 1997), the multiplier effect was not included in this study.

For the purposes of impact estimation, the Alabama seafood industry was divided into the following four categories: dealers and processors (D), shrimp fishermen (M), other fishermen (N), and charter boat owners and/or operators (C). Losses (L) were calculated from damages to vessels and facilities (F) excluding insurance coverage (S), beached vessels (V), lost inventories (I), wages and invoices unpaid (U), and revenues from past and future lost sales (R).

Losses to the Alabama seafood industry (L) can be described as the sum of these components as illustrated below:

$$L = (F\text{-}S)^{D+M+N+C} + V^{D+M+N+C} + I^{D+M+N+C} + U^{D+M+N+C} + R^{D+M+N+C}$$

Damages to public infrastructure included losses to fishing habitat, ship channel dredging, debris on fishing grounds, and public access to the waterfront. These were not included in this study for two reasons. First, Hurricane Katrina followed closely Hurricane Ivan (September 2004) and projects such as habitat enhancement and channel dredging were underway, and second, damages to access roads to the waterfront were relatively minor in the study area. Loan estimates were included in this study.

Sources of Data

The contract for this study was signed on 28 October 2005; the study was scheduled for completion by the end of November 2005. Personal interviews were conducted during October 14 and 15. More than 50 seafood dealers and processors were visited by investigators from the University of South Alabama and the Alabama Marine Resources Division asking them to complete a questionnaire designed by the authors. The questionnaire was also distributed by mail to all licensed Alabama resident commercial fishermen, charter boat owners/operators, and the area's seafood dealers not initially interviewed. A copy of the questionnaire used to survey fishermen, seafood dealers, and seafood processors has been placed in Appendix 1. The number of questionnaires mailed and returned is indicated in Table 1. The number of dealers and processors mailed the questionnaire does not include those who were interviewed personally:

Because the survey period was so close to the aftermath of the hurricane, many questionnaires were returned unopened, possibly

Table 1: Number of Mailed and Returned Questionnaires

Category	Mailed (Received)
Dealers & processors	189 (69)
Charter boat operators	154 (37)
Shrimp fishermen reporting landings	210 (52)
Other fishermen reporting landings	496 (66)

due to delivery problems. Time constraints prevented the mailing of a follow-up questionnaire possibly reducing the response rate. Licensed commercial fishermen with no landings (harvested seafoods sold to a licensed seafood dealer) reported to the Alabama Marine Resources Division were not included in the survey.

In conjunction with the mailed questionnaire and personal interviews, two additional surveys, each tailored to their respective seafood category, were incorporated in this study. The first survey was conducted by Alabama Marine Resources Division personnel who contacted Alabama charter boat owners/operators via telephone to survey damages immediately following Katrina. The second survey was conducted by the Organized Seafood Association of Alabama to evaluate damages through direct survey of its member dealers and processors.

Summary of Loss Estimates

Estimated losses based on survey responses are summarized in Table 2. Seafood dealer/processors also holding commercial fishing licenses were counted only once and placed in the dealers and processors category. Figures in Table 2 were obtained by multiplying the average of returned samples, including those obtained through personal interviews, to the total number of addresses in each group.

Some loss items required data collection beyond the questionnaire survey. The first item pertained to vessel removal. The removal of stranded/beached vessels continued to be a controversy several months after the hurricane hit. About 48 fishing boats were beached in Bayou La Batre alone (Henderson 2005). By early November, 12 boats had been removed either by boat owners' insurance companies

Table 2: Total Losses from Katrina to the Alabama Seafood Industry

Loss Items	Loss Amount	Sub-category
(F-S) Net value of damages on boats & facilities	$24,610,251.21	
(F) Damages on boats & facilities		
Dealers & processors		$19,741,679.63
Shrimp fishermen		$ 7,889,891.10
Other fishermen		$ 5,613,534.56
Charter boats		$ 4,096,752.66
subtotal		$37,341,857.95
(S) Insurance coverage		$12,731,606.74
(F-S) Net value excluding insurance coverage		$24,610,251.21
(V) Vessel removal	$ 3,840,000.00	
(I) Lost inventories	$20,519,138.06	
Dealers & processors		$ 3,408,895.24
Shrimp fishermen		$ 9,837,660.00
Other fishermen		$ 3,968,000.00
Charter boats		$ 3,304,582.82
subtotal		$20,519,138.06
(U) Wages & invoices unpaid	$ 5,846,943.82	
Dealers & processors		$ 3,934,179.00
Shrimp fishermen		$ 398,611.50
Other fishermen		$ 819,228.32
Charter boats		$ 694,925.00
subtotal		$ 5,846,943.82
(R) Lost revenues & future lost sales	$57,433,526.40	
Dealers & processors		$29,392,936.00
Fishermen		$18,885,107.00
Charter boat operators		$ 9,155,483.40
subtotal		$57,433,526.40
Grand Total	$112,249,859.49	
Potential Loss from Loans		
Loans from SBA		$ 5,809,000
Loans from Other Sources		$ 55,326,000
total loans		$ 61,135,000

or by the Federal Emergency Management Agency (FEMA). The remaining 32 uninsured vessels, however, remained beached and tied together by dock ropes. The problem was that FEMA removed boats that threatened public health, but refused to remove boats

unless boat owners agreed to pay a fee of up to $60,000 for removing their boat (Henderson 2005). The Organized Seafood Association, however, estimated that about 80 boats were stranded on the shore and estimated the cost of removing and repairing beached boats to be $100,000 per boat. As a compromise, boat removal and repair costs in Table 2 were adjusted as follows:

(80 + 48)/2 x $60,000 = $3,840,000 for vessel removal (see V in Table 2)

(80 + 48)/2 x $40,000 = $2,560,000 for vessel repair (included in F-S in Table 2)

The cost of vessel removal changed almost on a daily basis. It took more than a year before all beached boats were floated again.

The second item relates to the amount of lost sales caused by Hurricane Katrina. Based on personal interviews and questionnaire responses, the following assumptions were made regarding loss by month following the hurricane. Assumed losses for 2006 depended heavily on if and how quickly recovery assistance was received:

September 2005	100% loss
October 2005	75% loss
November 2005	50% loss
December 2005	25% loss
2006	25% loss

To calculate losses suffered by dealers and processors by month for 2005, it was necessary to know annual total sales of processed seafood and their breakdown into monthly sales. The amount of total sales of processed seafood for 2004 was $135,696,235 of which $83,317,538 was for shrimp, according to the Alabama Marine Resources Division. Monthly breakdown of total processed sales was not available. However, one of the largest and highly respected seafood processors in Alabama made their monthly data for 1993 through 2004 available for this study. According to the data, the monthly minimum share of annual total seafood processed was 5.822 percent (0.05822) in April and the monthly maximum share of annual total seafood processed was 11.186 percent (0.11186) in June with the average being 8.3333 percent (0.083333) and standard deviation of 1.6569 percent (0.016569). Monthly average shares for ten out of 12 months fall within one standard deviation from the mean (0.06676 to 0.09990), while all 12 monthly

averages fall within two standard deviations from the mean (0.05019 to 0.11647). Since there was no convincing evidence indicating a clear monthly fluctuation of all processed seafoods combined, it was assumed in this study that the total value of seafood processed remains equal each month at 1/12 (i.e., 8.3333 percent) of the annual total. Actual calculations of lost sales and lost future sales by type of seafood industry were made using the formula below:

Fishery Loss = [(Total Value of Fishery/12 months) x 100% loss for September] + [(Total Value of Fishery/12 months) x 75% loss for October] + [(Total Value of Fishery/12 months) x 50% loss for November] + [(Total Value of Fishery/12 months) x 25% loss for December] + [(Total Value of Fishery/12 months) x 25% loss for 2006]

The total amount of lost sales thus calculated for dealers and processors is $62,194,108. The total figure, however, included wholesale prices that processors paid to suppliers. According to the U.S. Census Bureau, the share of the cost of materials ($144,778,000) relative to total value of shipment ($247,034,000) for fresh and frozen seafood in Alabama was 58.6 percent. This adjustment was needed because the loss estimation in this section pertains to dealers and processors, who usually purchase their raw seafood for processing. Based on personal interviews, however, it was found that many dealers and processors also own their own boats to fish. To account for this observation, 10 percent of the total loss was assumed unaffected by the 58.6 percent share of the cost of materials. Net loss in sales for dealers and processors was calculated:

Net Loss = $62,194,108 x 0.10 + $62,194,108 x 0.90 x (1 - 0.586)
= $6,219,411 + $23,173,525
= $29,392,936

For estimation of loss in sales suffered by fishermen, it should be noted that Alabama has a trip ticket program which requires seafood dealers to report the seafood landings of each commercial fisherman by filling out a form (ticket) detailing the primary area of harvest, harvest gear, fishing and trip times, the quantity of each species harvested per condition and count size, and the dockside value of each. Seafood landed in Alabama by resident and non-resident fishermen may have

been caught anywhere inside or outside of Alabama's state waters. The amount of landings in Alabama, therefore, is not equal to the amount of catch in Alabama. Unlike data on processed seafood, Alabama seafood landings data are available monthly. The total dockside value of annual landings for fishermen for 2004 was $37,396,250 of which $29,540,012 was for shrimp, according to the Alabama Marine Resources Division. Lost sales to fishermen were calculated by applying the following formula separately to shrimp, crabs, fish, oyster, and other, and then obtaining the total at $18,885,107:

Fishery Loss = [(Total Value of Fishery/12 months) x Monthly Share x 100% loss for September] + [(Total Value of Fishery/12 months) x Monthly Share x 75% loss for October] + [(Total Value of Fishery/12 months) x Monthly Share x 50% loss for November] + [(Total Value of Fishery/12 months) x Monthly Share x 25% loss for December] + [(Total Value of Fishery/12 months) x 25% loss for 2006]

It is interesting to observe in Table 2 that the amount of loans from SBA comprises only a small portion (less than 9.5%) of total loans outstanding in Alabama's seafood industry. It is also noted that the amount of losses calculated in Table 2 may overestimate actual losses if a greater number of returned questionnaires were submitted by groups experiencing damages more than those of the general population, while the amount may underestimate actual losses to the extent that respondents' perception of future losses are more accurate than the percentages assumed in this study. Percentage losses in the future indicated in the returned survey questionnaires are significantly greater than those assumed in this study.

Conclusions

Hurricane Katrina delivered a severe blow to Alabama's seafood industry. Based on the findings of this paper in conjunction with data from various sources, Alabama's seafood industry, which is comprised of seafood dealers, commercial fishermen, and charter

captains, should be expected to incur losses of up to $112 million in the months following Hurricane Katrina. These losses stem from facility and vessel damages, inventory and sales losses, and loss wages to the workforce. Seafood dealers stand to lose valuable market share and processors struggle to locate seafood for processing. Additionally, potential losses of over $61.1 million due to forfeit or delinquency of encumbered loans could occur.

Financial losses incurred by Alabama's seafood industry were substantial. These losses severely impacted these businesses and to a lesser extent support industries at a local, state and national level. Alabama's seafood harvesting and processing sectors began limited operation within months after the hurricane hit while these sectors in Mississippi and Louisiana are expected to take a longer time to recover. Birkland (1996) suggests hurricane disasters often solicit short-term relief efforts and mitigation discussions; however, policies reflecting long-term mitigation for future hurricanes do not materialize. Hurricane Katrina was an atypical storm which may have provided the appropriate social impetus for changing the hurricane relief and mitigation policies in the USA. Hopefully, information contained within this paper and the report on which it is based will help policy makers identify and prioritize relief and mitigation efforts in coastal areas in order to reduce future financial distress associated with hurricanes.

Shown below are three of many comments that respondents to our questionnaire wrote to us. Note that names are excluded in the following quotations and comments are printed exactly as they are written:

> "I lost a 40 ft. shrimp boat due to hurricane Katrina. I've not gotten no help my boat was a total loss. I'm currently trying to get the coast-guard to help get my boat it's on the dock of a business. I don't have the money to make repairs to salvage the boat any help would be much appreciated fishing and shrimping is all I've ever done suffering a total loss is tragic to any commercial fishermen."

> "Since many crab suppliers on the gulf coast were wiped out, every crab processing plant in this area with east coast and Texas suppliers may be hanging on, but there's not enough

crab from those areas to supply all of us. We have therefore, closed our business since we no longer have anything for our employees to do."

"Our boat is sitting on the beach a total loss. We just don't know what to do with it. Been asking Coast Guard for help or anyone and still haven't received anything. It's sitting on private property and the people are asking for us to remove it. But where it's located we can hardly get to it by foot. It's sitting propped up between two pine trees so what can we do. Please help us. God Bless You. Thank you"

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