

**THE ECONOMICS AND POLITICS OF FISHERIES DISASTER RECOVERY:
LOUISIANA'S RESPONSE TO HURRICANES KATRINA AND RITA**

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ABSTRACT

On the morning of 29 August 2005, Southeast Louisiana was decimated by the winds and flood surge associated with Hurricane Katrina. Shortly thereafter, Hurricane Rita played havoc on the Southwestern part of the state. Louisiana's commercial seafood industry, already on the decline for a number of reasons, including declining output prices, was further crippled as a result of damage to vessels, docks, processors, and the distribution sector. Even those fishermen who were able to fish immediately after the hurricanes experienced problems selling the product due to the decimation of the distribution sector and the paucity of local customers. The Louisiana Department of Wildlife and Fisheries has been active in attempting to rebuild the commercial industry and, with the aid of economists at Louisiana State University, is attempting to more accurately estimate the damage caused by the hurricanes. Complicating the estimation of these damages is the fact that many of the fishermen, dealers, and processors were geographically displaced and unavailable for interviewing purposes. Estimates of damages must therefore be calculated using alternative methodologies, two of which are outlined in this paper. Additionally, the paper provides coverage of ongoing rebuilding efforts and the potential strength and weaknesses of these efforts in light of recent the economic trends facing the commercial fisheries in Louisiana.

Keywords: Hurricane Impacts, Damage Estimation, Commercial Fishing

BACKGROUND

August and September of 2005 saw hurricanes Katrina and Rita slam into coastal Louisiana with tidal surges that reached over 25 feet, devastating both the infrastructure and livelihoods associated with a commercial and recreational fishing industry that was second in size only to Alaska. The heavily damaged ports of Empire-Venice, Intercoastal City, and Cameron all were in the top 4 of the nation's fishing ports by volume (Table 1), with Louisiana's 2004 landings of \$309 million accounting for nearly 48 percent of total continental U.S. fishery value (NMFS 2005a). The severity of this natural disaster led U.S. Commerce Secretary Carlos Gutierrez to declare a formal fishing failure and fishing resource disaster for the Gulf of Mexico on September 9, 2005 (for hurricane Katrina) and October 4, 2005 (for hurricane Rita). These declarations authorized the U.S. Department of Commerce to request emergency assistance funds from Congress and to make those funds available for disaster assessment and recovery efforts targeting fishing communities.

In an effort to coordinate hurricane-related fisheries damage assessment and recovery, commercial and recreational fishing representatives united in December 2005 to form the Louisiana Fishing Community Rebuilding Coalition (LFCRC). This coalition was led by the Louisiana Departments of Economic Development (LDED), Health and Hospitals (LDHH), and Wildlife and Fisheries (LDWF), with the Louisiana Seafood Promotion and Marketing Board and the Louisiana Oyster Task Force provided industry coordination. Participants in the LFCRC included representatives from the seafood harvesting industry (shrimp, oyster, crab, menhaden, and commercial finfish), seafood dealers/processors, recreational fishing interests (charter boats and guide services) and several local governments. University

assistance to the coalition was provided by the LSU Center for Natural Resource Economics and Policy (CNREP) and the Louisiana Sea Grant College Program (Table 2).

Table 1: Top 10 US Fisheries Ports by Volume¹

<u>Ports</u>	<u>2004 Landings (millions of lbs)</u>
Empire-Venice, LA	400
Reedville, VA	375
Intracoastal City, LA	325
Cameron, LA	259
Pascagoula-Moss Point, MS	192
New Bedford, MA	155
Astoria, OR	114
Gloucester, MA	89
Los Angeles, CA	89
Portland, ME	69
Total US¹	2,067
Total LA	984

¹ *Excluding Alaska and Hawaii*

Initial meetings of the LFCRC resulted in a three-fold charge designed to guide coalition activities during the recovery process: 1) documenting the physical and economic impacts of storm-related damages; 2) developing requests to specific funding sources to assist in the recovery of commercial and recreational fishing sectors; and 3) recommending allocation mechanisms for financial aid that are sound and proportional to the physical and economic geography of storm damages.

In addition to these goals, the LFCRC concluded that the magnitude of the hurricane damage merited a multi-pronged approach that would enable the sectors to return to some level of pre-storm harvesting and processing capacity. Tier 1 priorities (to be immediately addressed) included rebuilding infrastructure, addressing housing needs of fishing families, providing financial assistance to fishermen and expansion of ongoing debris removal efforts.

Tier 2 priorities (to be addressed within two years) included addressing temporary labor shortages resulting from the storms, compensation of uninsured inventory and accounts receivable losses, development of affordable insurance programs for seafood processors, and the initiation of a marketing campaign to combat negative consumer opinions over the perceived quality and safety of post-hurricanes seafood products. Tier 3 priorities focused on long-term issues, including the development of safe harbors for the coastal fishing fleet, evaluation of the physical status and biological health of fisheries resources, and improvements in economic sustainability via increased attention to quality control, training for employees, and certification of seafood handlers.

**Table 2. Representatives to the Louisiana Fisheries
Community Recovery Coalition (LFCRC)**

United Commercial Fishermen's Association
Southern Shrimp Alliance
Plaquemines Parish Oyster Association
Omega Protein
Menhaden Advisory Council of the Gulf of Mexico
LSU Agricultural Center
Louisiana Wildlife Federation
Louisiana Shrimp Association
Louisiana Seafood Promotion and Marketing Board
Louisiana Sea Grant College Program
Louisiana Oyster Task Force
Louisiana Oyster Dealer and Grower's Association
Louisiana Department of Wildlife and Fisheries
Louisiana Charter Boat Association
Lake Pontchartrain Fishermen's Association
Jefferson Parish Marine Fisheries Advisory Board
Delta Commercial Fishermen's Association
Coastal Conservation Association
Blue Water Fishermen's Association
US-Vietnamese Commercial Fisherman's Union

Additional long-term priorities promoted by the coalition's university representatives, but not embraced by commercial representatives to the LFCRC, centered on the need to reconcile short-term recovery priorities with more than 20 years of economic downtrends facing the state's commercial fishing sector. Although not included in LFCRC's priorities, this latter issue would soon emerge in federal proposals for disaster assistance.

This paper addresses the core of these LFCRC initiatives and their implementation during the first post-hurricane year, with specific emphasis on the assessments of economic damage and the evolution of various funding requests for disaster assistance. Discussion of these issues is framed within the context of post-storm fisheries management and the economic downtrends experienced by Gulf of Mexico fisheries over the last 20 years.

INITIAL ASSESSMENTS AND REQUESTS

The first goal of the LFCRC was to document the physical and economic impacts of storm-related damages resulting from Hurricanes Katrina and Rita to be used as justification for various emergency funding requests. In the month following the two storms, rapid economic assessments were conducted by the Louisiana Department of Wildlife and Fisheries (LDWF) and the Louisiana State University Agricultural Center (LSU AgCenter). These reports, published widely in the media and used as the basis for various legislative actions, were developed using different methods and assumptions, and in some cases were inconsistent with established economic procedures for damage assessment following natural disasters.

The initial assessment developed by LDWF estimated fishery losses in Louisiana at more than \$2.5 billion due to Hurricane Katrina alone. That estimate included approximately \$1.7 billion in dockside and retail losses to commercial and recreational fishing sectors, plus an additional \$861 million in resource damages to oyster reefs (LDWF 2005). The LSU AgCenter report focused primarily on revenue losses, estimating that commercial and recreational fishing sectors would lose \$275 million in 2005 and 2006 because of Hurricanes Katrina and Rita (LSU AgCenter 200). Despite their inconsistencies the two reports were frequently cited - often in combination - in support of various emergency funding initiatives.

The most ambitious of the post-Katrina emergency funding requests came from a Louisiana congressional delegation named the PELICAN Commission (Protecting Essential Louisiana Infrastructure, Citizens and Nature). In October 2005, the PELICAN Commission released an emergency appropriations request of unprecedented scale, including 124 line item requests within 20 categories for a total of \$250 billion. Approximately \$355 million of that request was earmarked for fisheries and seafood recovery. The Commission was roundly criticized by other members of Congress and the media, and the proposal was subsequently withdrawn. Such ambitious funding requests were not limited to state sponsors. The largest fisheries related request came in a February 2006 plan developed by the National Marine Fisheries Service (NMFS 2005_b). The NMFS plan contained 22 categories of fisheries-specific spending totaling \$1.25 billion, with \$490 million earmarked for the restoration of essential fish habitat (NMFS 2005). The most contentious aspect of the NMFS proposal, however, was not that 40% of the budget was designated for habitat restoration, but that more than \$250 million was to be used for restructuring Gulf fisheries through various programs designed to reduce fishing effort (i.e., vessel and permit buyouts and resource privatization). Such measures were not well received in Louisiana, where open access to fisheries is often viewed as a birthright and an economic safety net for coastal residents. The LFCRC eventually adopted an a la carte response to the NMFS plan, rejecting those sections dealing with effort reduction while supporting more than \$1 billion in emergency aid outlined in the remaining 19 categories.

Meanwhile, the LFCRC was also pursuing an additional \$50 million in relief funding through the newly-established Louisiana Recovery Authority (LRA), which had been tasked with distributing billions of dollars coming to the state in the form of Community Development Block Grant (CDBG) funding. An additional \$200 million in aid for the oyster industry was reportedly authorized through the USDA Emergency Conservation Program (ECP). The current status of the CDBG and ECP funding, however, remains unknown at the time of this writing.

In April 2006, portions of the controversial NMFS plan appeared to reemerge in a request included as part of Emergency Supplemental Appropriations Bill H.R. 4939. That subtitle called for \$1.1 billion under 17 categories of disaster relief funding. And, while capacity reduction was included as one of those categories, the requested level was only a fraction (4%) of the amount previously outlined under the NMFS plan. Indeed, when the Emergency Supplemental Appropriations Act was signed in June 19, the entire fisheries disaster subtitle had been reduced substantially. The final version authorized \$118 million to be disbursed under 4 categories, none of which mentioned capacity reduction.

REFINING THE ASSUMPTIONS

Despite the frenzy associated with the disaster assistance process and the eventual authorization of \$118 million in federal funding, one year after Katrina's landfall Louisiana's commercial fishermen had yet to receive any form of federal aid. Most of this delay was simply due to Congress being slow to act, but there were other contributing factors. In late 2005, NMFS recognized the need to initiate formal economic evaluations of post-hurricane damages in an effort to more accurately calculate the value of damages incurred by specific fishing sectors along the northern Gulf of Mexico. The intent was to

develop objective, non-political estimates for use in the emergency aid appropriations process. Studies were commissioned with resource economists located in Alabama, Mississippi, and Louisiana.

Given the level of destruction experienced in Louisiana from both Katrina and Rita, the wide geographic extent of the damage, and continuing depopulated status of the effected areas, traditional survey methods could not be systematically or comprehensively executed. Because of these limitations, the Louisiana assessment was limited to a revenue-based approach, somewhat similar to the approach used in the rapid assessments developed by LDWF and the LSU AgCenter immediately following the two storms. Unlike initial reports, however, this subsequent assessment incorporates economic and physical data that is geographically-specific.

Economic Data

Since 1999, the LDWF has maintained "trip ticket" records which capture information on dealers, fishermen, area fished, trip length, species landed, quantity landed, and price. This site-specific data, used in conjunction with limited ground-truth observations and other physical data, can be used to infer where specific fisheries infrastructure existed prior to the storms, its economic value, and the corresponding levels of economic damages to that infrastructure.

In June 2006, seafood processing and dealer trip ticket data were obtained from the NMFS Southeast Fisheries Science Center and commercial fishing vessel data were obtained from the LDWF. More than 2 million transaction records were acquired for the years 2002 - 2004. Unlike the highly aggregated data used in previous assessments, these records constitute a location-specific picture of the fisheries infrastructure that existed prior to the two storms. Figures 1, 2, and 3 provide a general depiction of this data showing the spatial distribution (by city) of the 11,213 commercial vessels, 1,133 seafood dealers, and 114 seafood processors, respectively.

Physical Data

The acquisition of trip ticket data provides the site-specific, firm-level information required for a more accurate assessment of the fisheries infrastructure in the path of Hurricanes Katrina and Rita. However, some form of physical data related to each storm is required to develop more refined assumptions of infrastructure damage. For hurricanes, economic damage is primarily the result of wind speed and water heights, with coastal storm surge being one of the more critical determinants. In the past five years, the

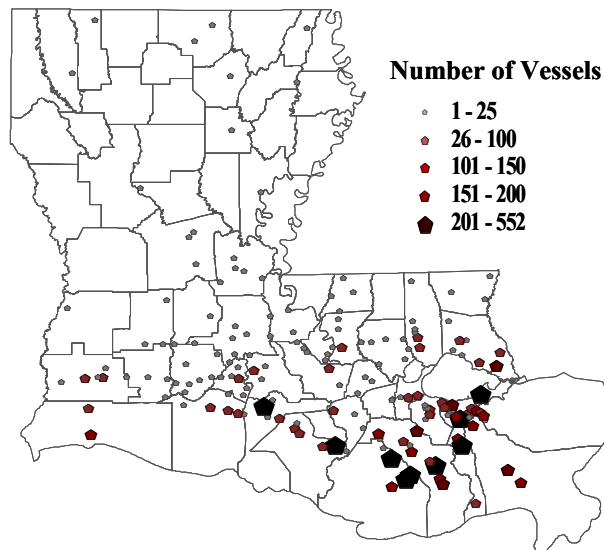


Figure 1. Louisiana Commercial Fishing Vessel Locations by Port City, 2002-2004.

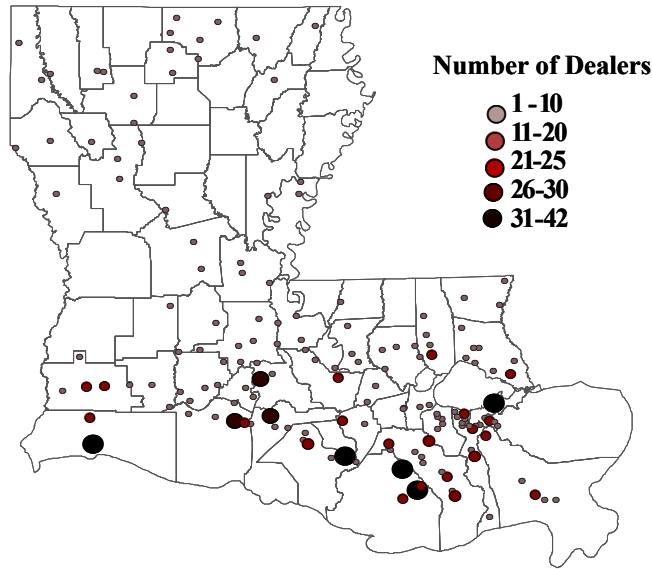


Figure 2. Louisiana Commercial Seafood Dealer Locations by City, 2002-2004.

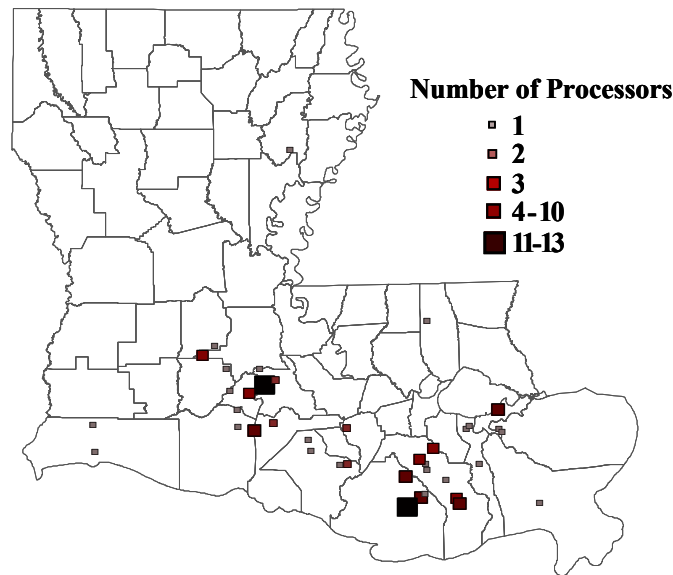


Figure 3. Louisiana Commercial Seafood Processor Locations by City, 2002-2004.

LSU Hurricane Center has used a modified version of the ADCIRC Coastal Circulation Model to predict maximum flood and surge levels associated specific storm events. Applied to surge modeling, ADCIRC incorporates data generated by the National Weather Service on storm trajectory and storm magnitude and combines that information with detailed data on coastal bathymetry and elevation (ADCIRC Development Group 2006).

In May 2006, spatial and numerical data regarding maximum water levels for Hurricanes Katrina and Rita were obtained from the LSU Hurricane Center. These data were the product of multiple ADCIRC model runs conducted prior to landfall. The iterative refinement of model forecast, combined with post-storm

hind-casting, produces a detailed depiction of the maximum flood heights across coastal Louisiana for Hurricanes Katrina and Rita. Maximum water level records were developed through this process for more than 500,000 coastal Louisiana locations. Figure 4 is a conceptual depiction of the maximum water levels for Hurricane Katrina based on the ADCIRC data provided by the LSU Hurricane Center. This information, used in conjunction with trip ticket data and limited field observation, allows estimation of damages on a site-specific basis where infrastructure was known to exist but where no post-storm surveys were conducted.

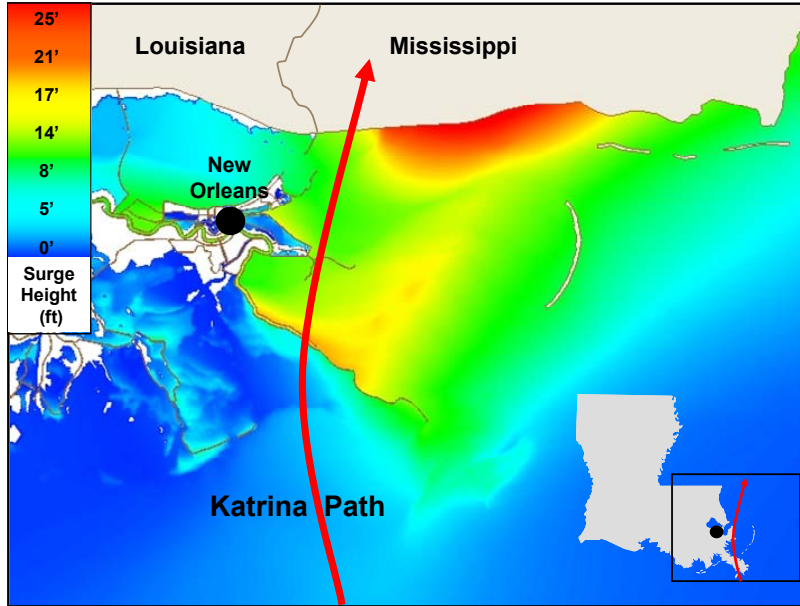


Figure 4. Maximum Water Levels for Hurricane Katrina derived from ADCIRC modeling conducted by the LSU Hurricane Center.

Alternative Assessments Methods

Preliminary reports from NMFS contractors in Alabama and Mississippi indicate that damage assessments for those states were conducted using direct surveys and input-output analyses. In contrast, the method used for Louisiana is based on an income capitalization. For fishing sectors where revenue data were available, an indirect assessment of infrastructure damage can be developed using one of two approaches. The first method, a form of partial income capitalization, is derived from property appraisal techniques in which the value of business’s infrastructure is expressed as a function of the net income generated by that infrastructure (AIREA 1983). The formula for damage estimation under this method is given by:

$$D^A = \frac{\left((GR^A * NI^{AB}) * Z^A \right)}{r^B} \tag{1.1}$$

where D^A is total economic damage in dollars for firm A, GR^A is the annual gross revenue of firm A (derived from trip ticket data), NI^{AB} is the net income percentage of firm A in terms of the average returns for a specific fishing sector B (derived from secondary data and industry reports), Z^A is a geographically specific estimate of percent revenue loss (derived by correlating ADCIRC water levels to field

observations of actual damage), and r^B is an industry specific capitalization rate ranging from 5 to 15 percent.

The second method, a discounted loss approach, is similar to the first except that net income and infrastructure losses are discounted over a 5 year period under the assumption that the status of damage recovery cannot be reasonably estimated beyond that time frame (World Bank 2003). The formula for damage estimation under this method is given by:

$$D^A = \left((GR^A * NI^{AB}) * Z^A \right) * \left((1 + r^B)^{yr} \right) \quad 1.2$$

where D^A is the present value of dollars lost to firm A due to infrastructure damage and lost production over 5 years, GR^A , NI^{AB} , and Z^A are as specified above in equation 1.1, r^B is a risk adjusted capitalization rate ranging from 5 to 20 percent, and yr is years 1-5.

A preliminary study using these two methods was conducted for the LFCRC in February 2005 using highly aggregated economic data and assumptions of revenue loss. The resulting infrastructure loss estimates for commercial vessels, dealers, and processors in Louisiana ranged from \$272 million to \$585 million. It was not until May and June that detailed trip ticket data and ADCIRC data were acquired, thus refinement of these damages estimates is currently ongoing. While these approaches will eventually produce more conservative assessments of firm-level or site-specific damage, several gaps remain in the data. Additional work is needed to address the economic implications associated with loss of recreational infrastructure, as little or no revenue data are available for marinas or other ancillary support business like motels, restaurants, and bait shops. Furthermore, little information exists on the more than 35,000 recreational boats the U.S. Coast Guard estimates are either missing, damaged, or in need of salvage. Despite these recreational sector shortcomings, the methods described above can be used to provide a rapid economic damage assessment that is more detailed, site specific, and credible for expediting emergency relief programs. With additional refinement, such approaches could be used in a predictive manner, using simulated storm events to estimate the degree of risk to existing or potential businesses locations along the coast.

BROADER ISSUES

Long before Katrina and Rita, market forces were exerting tremendous economic pressure on individuals who depended on the seafood industry as their sole source of income. The largest sector of that industry by value, shrimp, is also the most threatened by those forces. To better understand how the post-Katrina future will play out for this sector, it is helpful to consider the recent past.

Economic Squeeze

The number of people commercially harvesting shrimp in state and federal waters of the northern Gulf of Mexico has been declining for years. Louisiana resident commercial fishermen licenses have declined 37% since 1987, and shrimp gear license sales have fallen 42% (Horst and Holloway 2002; LDWF 2004). During that same period, the number shrimp processors in the southeastern U.S. declined from 124 firms in 1980 to 72 in 2001 (Diop et. al. 2006). But, despite these trends, the volume of domestic shrimp landed and processed has not declined substantially, due primarily to consolidation. This apparent paradox is an outgrowth of increased trade in seafood products and has been observed in many other U.S. industrial sectors. Imports of aquaculture shrimp into the U.S. have increased from about 200 million pounds to more than 1.2 billion pounds in the past 20 years (Diop et. al. 2006). During this same period,

the adjusted dockside price of Gulf shrimp declined by more than half (Figure 5). For the harvesting sector, stagnant and declining output prices have been compounded by an expanding suite of regulatory actions, most of which target the reduction of incidental species bycatch. The cost of regulatory compliance; however, has been minor compared to the problem of rapidly increasing fuel costs. After a recent low of \$0.96 per gallon in 1999, the average price of U.S. diesel fuel increased steadily for 6 years, reaching a high of \$3.01 per gallon in October 2005 immediately following Hurricanes Katrina and Rita (Figure 6).

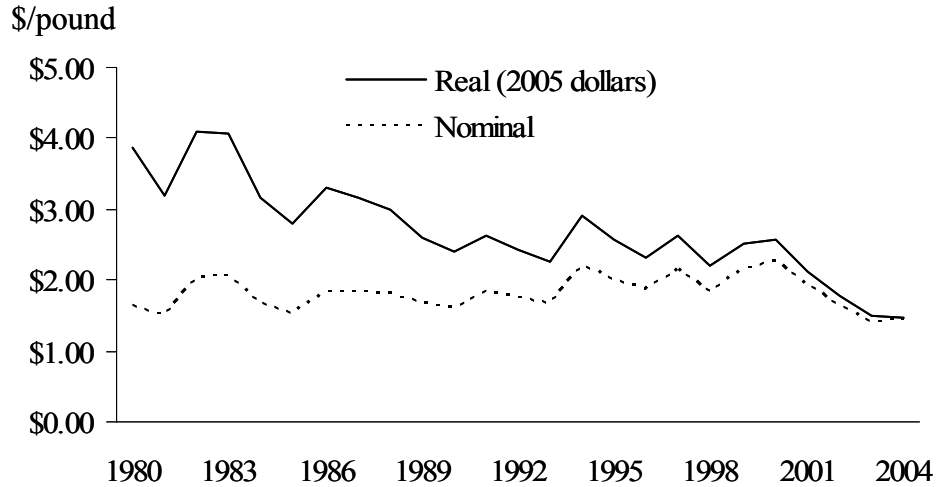


Figure 5. Nominal and Adjusted Dockside Price of Gulf Shrimp (NMFS, 2005).

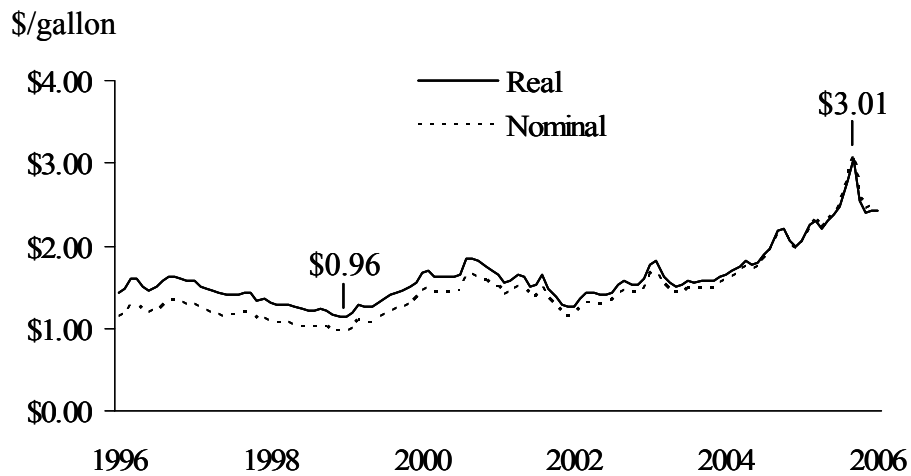


Figure 6. Nominal and Adjusted Monthly Prices for U.S. Diesel Fuel (DOE 2005).

Because of these economic factors, many of the state's shrimp harvesters that were not damaged by Katrina and Rita still remain in port, finding it too expensive to fish given the prohibitive cost of fuel and current dockside prices. For vessels with a more efficient cost structure; however, the post-storm environment has been very productive. Those vessels, estimated by some at only 25-30% of Louisiana's pre-storm fleet, have more than made up for lost capacity. According to market news compiled by NMFS, landings of shrimp in the first half of 2006 are up substantially for most of the northern Gulf, and Louisiana landings are 47% above the 5-year average for this same period (NMFS 2006). Clearly, volume

landings are allowing economically-viable vessels to overcome high fuel cost and low dockside prices, although profit for these vessels may be relatively low compared to earlier years. This scenario is not unlike that played out following previous damaging hurricanes, where the remnant shrimp fleet often experienced a post-hurricane surge in landings. The biological drivers of this increased productivity are not well-known, but are likely a combination of enhanced larval transport and detrital fertilization caused by the storms. The primary economic driver of this phenomenon is most likely a function of reduced competition for the fixed resource.

Capacity Concerns

The disaster declarations issued by Secretary Gutierrez nearly one year ago initiated a sequence of events that resulted in more than \$118 million in federal relief funds for fisheries recovery. One stipulation of that assistance, however, is that before funds are disbursed, the Secretary must first "determine that the activity will not expand the commercial fishery failure in that fishery or into other fisheries or other geographical regions" (CFDA 2006).

The extent to which federal fisheries disaster aid for Katrina and Rita will either mitigate or compound the existing crisis depends largely on how "failure" is defined. Clearly, the storms' tremendous impact on infrastructure has resulted in business failures for an unprecedented number of fishermen and small businesses. It is also true that many of those businesses were already on the brink of failure because of market forces. In contrast, the fish stocks themselves have proven resilient, with populations and harvests for certain species significantly higher than pre-storm levels. Long-term habitat implications aside, the fisheries resource has not failed beyond the short-term impacts to oyster reefs directly in the path of the two storms. Correspondingly, much of the proposed spending is tentatively targeted at oyster reef restoration.

For many in the shrimp fishery, however, Katrina and Rita may signal a threshold beyond which it will be impossible to recover given current market forces. For some that do survive, the provision of federal aid may simply serve to exacerbate ongoing economic losses. For this reason, and to address externalities associated with incidental bycatch, effort-reduction programs were featured in many of the initial aid packages. Those initiatives failed because of their perceived high cost and opposition from the commercial sector.

SUMMARY

Louisiana continues to be a leader in U.S. fisheries production despite the tremendous devastation wrought by Hurricanes Katrina and Rita in 2005. The organizational response to these two storms during the past year has included establishment of a Louisiana fisheries recovery coalition, ongoing refinement of economic damage assessments, and the eventual authorization of millions of dollars in federal aid. Most people working with the seafood industry would have predicted such actions as inevitable, given the magnitude of devastation caused by the two storms. How the next few years will play out is much less predictable. The storms themselves drastically reduced fishing capacity in the Louisiana commercial fishing fleet to a level that no effort-reduction program could have ever achieved in such a short period of time. How long capacity will remain at this new equilibrium, however, will be determined by a number of factors, including dockside prices, fuel costs, post-storm fisheries abundance, and the speed and specifics through which federal disaster funding is ultimately disbursed.

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