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Survey of
Seafood Products
Handled by
Mississippi Restaurants

MAFES
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ABSTRACT

This bulletin summarizes the major species of seafood products handled, sources of seafood products served, and annual gross sales and direct employment generated by seafood restaurants that participated in our survey. A total of 292 restaurants operating in Mississippi completed the survey in summer and fall 2011. More than two-thirds of the restaurants that completed the survey reported that they served seafood products in 2009. The leading fish species purchased was catfish, followed by tilapia, salmon, tuna, and snapper. Shrimp was the top shellfish species purchased, trailed by oysters, crawfish, scallops, and blue crab. Among the restaurants that served seafood in 2009, the annual seafood expenditures averaged $53,926. Participating establishments were generally small or medium-sized businesses. A typical business establishment employed 13.5 full-time workers in 2009. Participating restaurants hired an additional 9.6 part-time workers per establishment.

Survey of Seafood Products Handled by Mississippi Restaurants

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INTRODUCTION

Due to the lack of seafood sales and employment data in the sector, recent economic impact estimates of the seafood industry in Mississippi excluded the seafood restaurant sector (Posadas 2009a, 2009b). In earlier economic impact estimates, total and "by species" sales values of the Mississippi "seafood restaurant trade" sector were calculated from the "per unit landing ratio" between the "annual retail trade from food service sales value" and "annual commercial landings value." Users of the previous estimates, however, were advised with caution when applying these seafood restaurant trade values since these values were not verified (MSU-CREC 1991, Posadas 1996). The official estimates of the economic impacts of the seafood industry by state, region, and nation that was started in 2006 included restaurants lumped under the retail sector (NOAA Fisheries 2012).

To improve the estimation procedure of the economic impact of the seafood restaurant sector, a survey of a random sample of restaurant establishments operating in Mississippi was conducted in 2011. Annual values of seafood transactions were needed in estimating the economic impacts of the seafood restaurant sector. The seafood restaurant sector is represented by the "Food services and drinking places" IMPLAN sector 413 (MIG Inc. 2009). This economic sector includes "full-service restaurants," "limited-service restaurants," and "drinking places" in the North American Industrial Classification System (NAICS 2011).

The determination of the size and composition of the seafood restaurant sector was based on secondary data on the eating and drinking places sector. There were 4,139 restaurants and drinking places reported by the U.S. Census Bureau in 2008, as Table 1 and Figures 1–3 show. The ultimate goal of this project was to determine the economic impact of the seafood restaurant sector in Mississippi for 2009. In order to accomplish the overall goal of estimating the economic impacts of the Mississippi restaurants sector by major species, it was deemed necessary to achieve the following specific objectives:

(1) To determine the major species of seafood products handled by the restaurant sector in 2009;

(2) To determine the sources of seafood products served by the restaurant sector in 2009; and

(3) To estimate the annual gross sales and direct employment generated by the seafood restaurant sector in 2009.

The results of this survey will be used in estimating the annual economic impacts of the Mississippi seafood restaurant sector in 2009 and 2011. Estimates of the economic impacts of the sector will

be broken down by major species sold in the state—primarily shrimp, oysters, crabs and finfish—based on the results of the 2011 survey. The economic impacts of the sector by major species will be estimated by using IMPLAN Professional 3.0 Software and data (MIG Inc. 2009, 2010, 2012). These impact-planning software and data files will facilitate the estimation of economic impacts with the use of the most appropriate multipliers.

There is a growing need for benchmark information about the local seafood restaurant sector as a basis for estimating how natural or technological disasters impact the industry. In addition, the changing perceptions about local seafood arising from these disasters also have serious effects on the seafood restaurant industry.

The growing preference for local seafood by restaurants is a boost that the industry needed to recapture its market share. Thorn (2011) reported that in a survey of nearly 1,800 chefs conducted from October to November 2011 by the National Restaurant Association, use of locally sourced meats and seafood was the top trend predicted for 2012, followed by use of locally sourced produce.

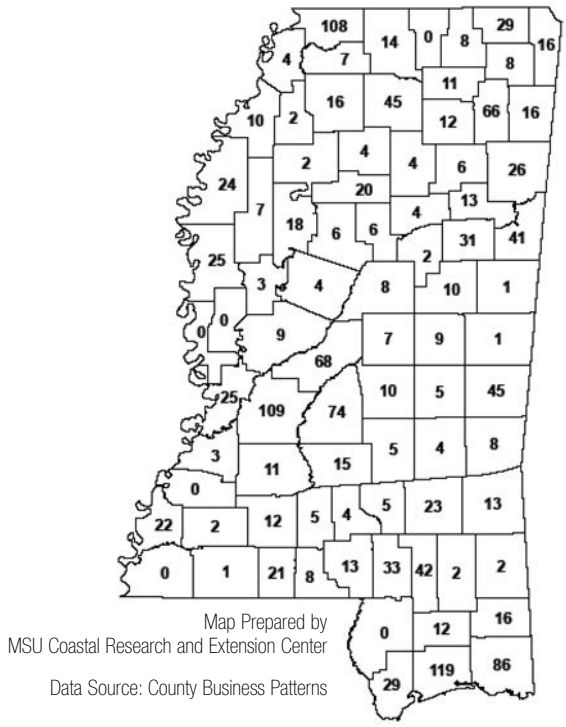

Figure 1. Number of Mississippi full-service restaurants, 2008. Source of raw data: U.S. Census Bureau (2010).

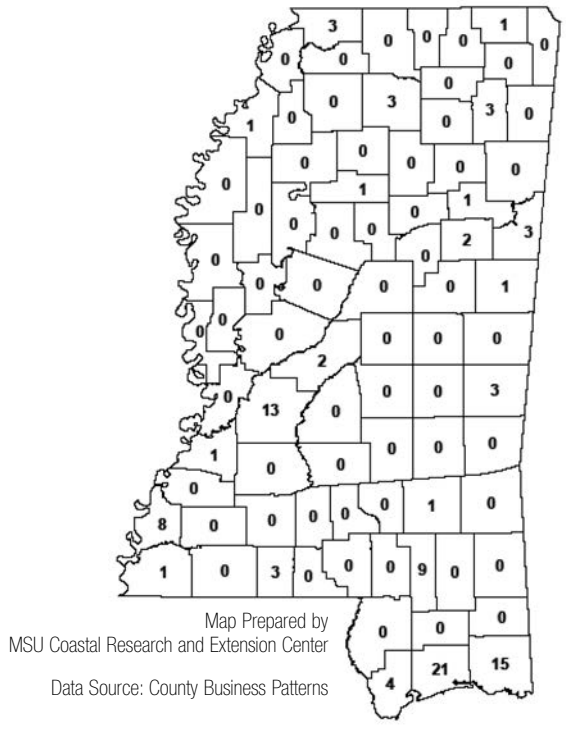

Figure 3. Number of Mississippi drinking places, 2008. Source of raw data: U.S. Census Bureau (2010).

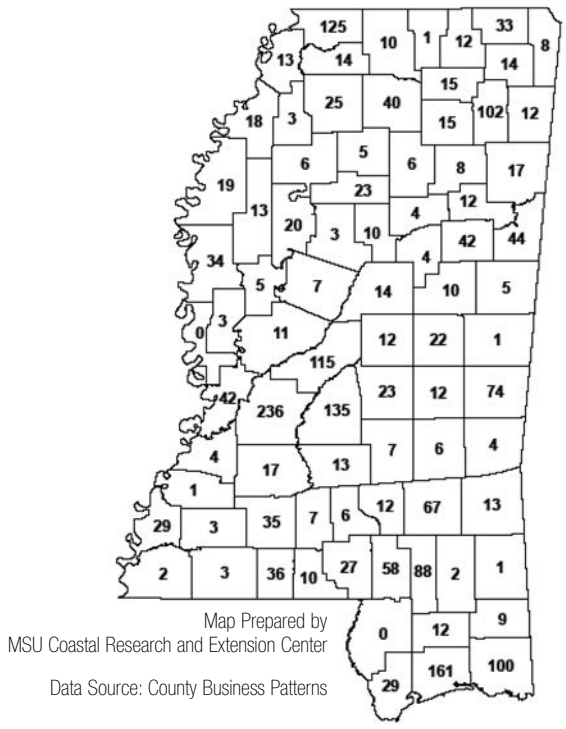

Figure 2. Number of Mississippi limited-service restaurants, 2008. Source of raw data: U.S. Census Bureau (2010).

Table 1. Mississippi eating and drinking places in December 2008 by type of establishment.

Type of establishment	Number of establishments	Percent of total number	Sample of establishments included in the survey
Full-service restaurants	1,539	37.2	558
Limited-service restaurants	2,499	60.4	906
Drinking places	101	2.4	37
Total	4,139	100.0	1,501

Source of raw data: U.S. Census Bureau (2010).

METHODS

Data Collection

A survey of a random sample of eating and drinking places (EDP) operating in Mississippi was conducted in summer and fall 2011. The survey was developed with assistance from seafood industry professionals at Mississippi State University, the Coastal Research and Extension Center (CREC), and the Mississippi Department of Marine Resources (MDMR). The recruitment letter and the survey, as approved by the Mississippi State University Internal Review Board, are shown in Appendix A and B. The mail surveys were sent to EDP establishments licensed in Mississippi to collect the following information:

- Total annual seafood purchases;
- Percent of purchases from Mississippi;
- Percent distribution of seafood transactions by major species—finfish, shrimp, oyster, and crabs;
- Major finfish species handled, including but not limited to salmon, tilapia, tuna, grouper, snapper, catfish, flounder, redfish, cobia or lemonfish, trout, mahi-mahi or dolphin fish, pollock, haddock, cod, and others;
- Major shellfish species handled, including but not limited to shrimp, oysters, crabs, crawfish, lobsters, clams, mussels, octopus, squid, roe, and others;
- Sources of major species handled—Mississippi, other Gulf of Mexico states, other states in the U.S., and other countries;
- Number of hired workers employed—full-time and part-time;
- Total annual gross sales; and
- Percent of total annual gross sales consisting of seafood products.

A random sample of 1,501 EDP establishments was selected from the total population of each of the three subsectors within the EDP industry provided by the Mississippi Department of Health (2010) and the U.S. Census Bureau (2010) (Table 1). The sample size was determined by the allotted budget for mail-outs of the survey, which was also deemed statistically sufficient to infer survey results to the entire population. The sample size of each subsector was proportionally allocated in the total sample size. The number of establishments in each subsector included in the total sample was as follows: full-service restaurants (FSR), 558; limited-service restaurants (LSR), 906; and drinking places (DP), 37.

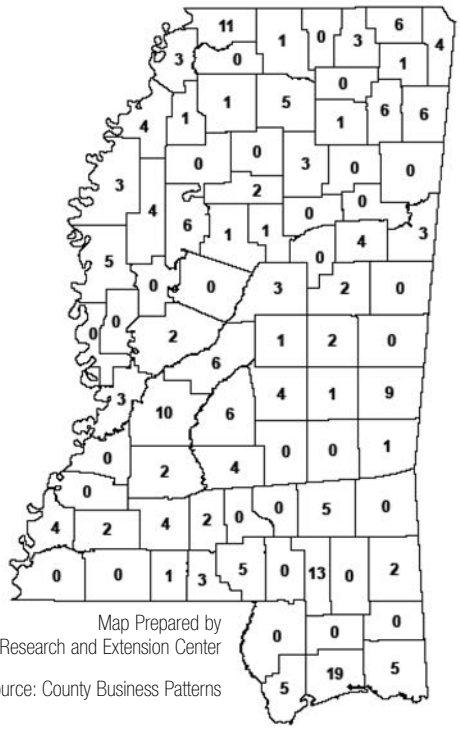

Figure 4. Number of Mississippi full-service restaurants that participated in the survey.

For complete random sampling, Microsoft Excel 2007's "Random Between" function was used for each subsector. The function was inserted with the total number for each subsector, and each establishment was given a random code. The next step was to sort the random code from smallest to largest, rearranging the establishments by their random code. From there, the required number of establishments was taken off the top of the list and put into a new Excel worksheet.

Mail surveys were initially sent to the random sample of EDP establishments in May 2011. A second mail-out of the surveys was sent out in July 2011. A postcard reminder with an online survey web address was sent in October 2011 to those who did not respond to the earlier mail-outs. The earlier mail-outs resulted in the participation of 150 EDP establishments. Due to a low overall response rate, a third mail-out of the recruitment letter and survey were sent in November 2011 to those who did not respond to the earlier mail-outs. The third mail-out led to the participation of an additional 156 EDP establishments.

Data Analysis

The answers to the questions asked in the survey were tabulated and compared by type of establishment, location of business, and size of business. The tabulation of the results was performed by using the frequency and crosstabs procedures in SPSS (version 20.0 for Windows, IBM Corporation, Armonk, New York). The analysis of variance was performed by using the general linear model (GLM) procedures in SPSS version 20.0.

The three types of EDP establishments included in the survey were full-service restaurants (FSR), limited-service restaurants (LSR), and drinking places. The NAICS code 722110 or "full-service restaurants" industry includes establishments primarily engaged in providing food services to patrons who order and are served while seated (i.e., waiter/waitress services) and pay after eating. The NAICS code 722211 or "limited-service restaurants" industry includes establishments primarily engaged in providing food services (except snack and nonalcoholic beverage bars) where patrons generally order or select items and pay before eating. The NAICS code 722410 or "drinking places" industry

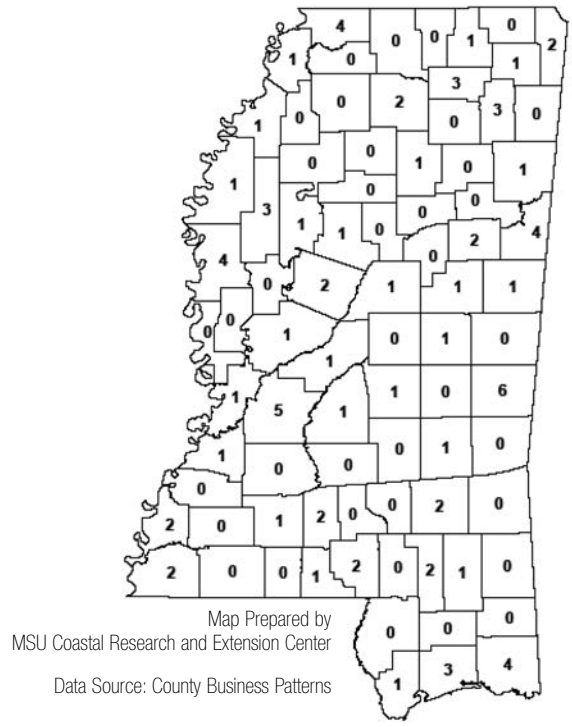

Figure 5. Number of Mississippi limited-service restaurants that participated in the survey.

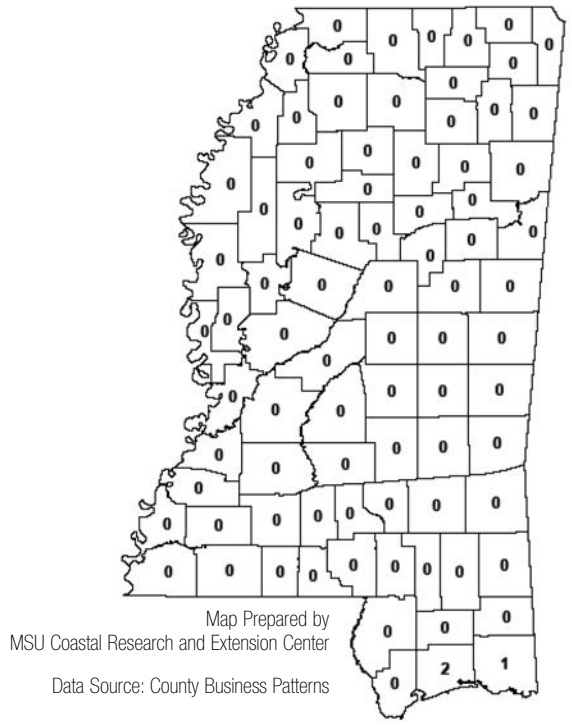

Figure 6. Number of Mississippi drinking places that participated in the survey.

includes establishments known as bars, taverns, nightclubs, or drinking places primarily engaged in preparing and serving alcoholic beverages for immediate consumption. These establishments may also provide limited food services.

The primary Mississippi Gulf Coast counties include Hancock, Harrison, and Jackson Counties. There were 29 FSR establishments in Hancock County, 119 in Harrison County, and 86 in Jackson County in 2008 (Figure 1). Of LSR establishments, there were 29 in Hancock County, 161 in Harrison County, and 100 in Jackson County (Figure 2). Of drinking places, there were 4 in Hancock County, 21 in Harrison County, and 15 in Jackson County (Figure 3).

Business size was measured in terms of total annual gross sales (AGS). Business sizes included small, medium, large, and super large. Small firms are those with AGS less than $200,000. Medium businesses are those with AGS between $200,001 and $500,000. Large establishments are those with AGS between $500,001 and $1 million. Super-large companies are those with AGS above $1 million.

RESULTS AND DISCUSSION

Participating Mississippi Restaurants

A total of 306 Mississippi EDP establishments participated in the 2011 survey, representing a gross response rate of 20.4%. The total number of participating EDP establishments included 218 full-service restaurants, 85 limited-service restaurants, and 3 drinking places. Fourteen survey forms were excluded from the analysis because three were returned blank, eight establishments were closed or not operating in 2009, and 3 establishments were not EDP. The number of usable survey forms completed was 292, which represent a net response rate of 19.5% (Table 2).

About 13.7% or 40 business establishments were located in the coastal counties of Hancock, Harrison, and Jackson. Among the 245 establishments that reported their annual sales, 34.3% have annual sales less than $200,000, 30.5% generated annual sales between $250,000 and $500,000, 19.2% grossed between $500,000 and $1 million, and the remaining 15.9% raised more than $1 million in annual sales.

Mississippi Restaurants that Served Seafood Products

Respondents were asked to indicate whether they served seafood products in their restaurants in 2009 (Appendix B, question 1). Responses to this question are critical in determining the contributions of seafood products in the Mississippi EDP sectors. The decision to serve seafood products in 2009 was hypothesized to be influenced by the type of eating experience, location of business, and size of the business.

More than 68% (199 restaurants) of respondents reported that they served seafood products in 2009. Results of the chi-square analysis indicated the decision to serve seafood in 2009 was significantly influenced by the type and location of the participating businesses. Although the percentages indicated that establishments with annual sales above $200,000 tend to serve seafood as part of their menu offerings, the results of the chi-square analysis indicated that the size of business did not influence the decision to serve seafood products in 2009 (Table 3).

Relatively more of the full-service restaurants than the limited-service restaurants tended to serve seafood products in 2009. More than 68%) of the participating EDP establishments reported serving seafood in 2009 (Table 3). Almost 78% of the full-service restaurants and 42.7% of the limited-service restaurants reported serving seafood to their customers. No statistical inferences about drinking places were made because less than five DP establishments participated in the survey.

Table 2. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011 by type of establishment.

Type of establishment	Number of establishments	Percent of total number	Percent participation rate
Full-service restaurants	208	71.2	37.3
Limited-service restaurants	82	28.1	9.0
Drinking places	2	0.7	5.5
Total	292	100.0	19.5

Table 3. Mississippi eating and drinking places that participated in the survey from May to December 2012, which served seafood in 2009 by type, location, and annual gross sales.

Sector	Number that served seafood	Percent that served seafood
Type of establishment:		
Full-service restaurant ***	162	77.9
Limited-service restaurant***	35	42.7
Drinking places	N<5	N<5
Total	199	68.2
Location of establishment:		
Noncoastal counties**	167	65.7
Coastal counties**	32	84.2
Total	199	68.2
Size of business (annual gross sales):		
Small (less than $200,000)*	56	66.7
Medium ($200,00 to $500,000)*	62	82.7
Large ($500,000 to $1,000,000)*	35	74.5
Super large (above $1,000,000)*	32	82.1
Total	185	75.5

*, **, *** Pearson chi-square significant at 0.087, 0.025, 0.001.

Participating EDP establishments located in the primary Mississippi Gulf Coast counties showed greater tendency to serve seafood as compared with those located in noncoastal counties. Approximately 84% of the participating EDP businesses located in the Mississippi Gulf Coast counties served seafood products in 2009. Almost 66% of the participating EDP businesses located in noncoastal counties included seafood products in their menu offerings in 2009.

Fish Species Handled by Mississippi Restaurants

Respondents were asked to indicate which fish species their establishments bought in 2009, as well as the supply source (Appendix B, question 2). The list of fish species was developed during a focus group attended by CREC and MDMR faculty and staff.

The list of preferred fish species is important because most of these species are harvested from the state and federal waters of the Gulf of Mexico. Species preferences of Mississippi EDP businesses for fish products are shown in Table 4. The list shows the number and percent of the participating restaurants that served the fish products in 2009.

The leading fish species, catfish, was purchased by 134 (45.9%) of the participating EDP establishments. The next four predominant fish species bought by more than 10% of the participating EDP establishments were tilapia, salmon, tuna, and snapper. The second group of

Table 4. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011, which bought fish products in 2009.

Fish species bought	Number that bought fish species	Percent that bought fish species
Catfish	134	45.9
Tilapia	55	18.8
Salmon	53	17.8
Tuna	41	13.7
Snapper	36	12.3
Flounder	30	10.3
Mahi-Mahi, Dolphin fish	25	8.6
Grouper	24	8.2
Cobia, Lemonfish	15	5.1
Red Drum	12	4.1
Sea Trout	10	3.4
Pollock	8	2.7
Black Drum	7	2.4
Cod	6	2.1
Mullet	2	0.7
Haddock	1	0.3

Table 5. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011, which bought shellfish products in 2009.

Shellfish species bought	Number that bought shellfish species	Percent that bought shellfish species
Shrimp	169	57.9
Oysters	77	26.4
Crawfish	58	19.9
Scallops	43	14.7
Blue Crab	25	8.6
Snow Crab (Opilio)	21	7.2
Lobsters	21	7.2
Squid (Calamari)	20	6.8
Mussels	15	5.1
Clams	15	5.1
Dungeness Crab	10	3.4
King Crab	9	3.1
Octopus	4	1.4
Roe	4	1.4

fish species purchased by participating seafood restaurants included mahi-mahi, grouper, cobia, red drum, and sea trout. The third cluster of fish species served by the participating seafood restaurants included pollock, black drum, cod, mullet, and haddock.

Shellfish Species Handled by Mississippi Restaurants

Respondents were asked to indicate which shellfish species their establishments bought in 2009, as well as the supply source (Appendix B, question 2). The list of shellfish species was developed during a focus group attended by MSU faculty and staff handling seafood issues and MDMR staff handling seafood processing.

Species preferences for shellfish products included in the survey by the Mississippi EDP firms are shown in Table 5. The list of shellfish species preferred by seafood restaurants is important since several of these shellfish species are harvested from the state and federal waters of the Gulf of Mexico. The list shows the number and percent of restaurants that served the shellfish products in 2009.

Shrimp was the top shellfish species purchased by 169 (57.9%) of the participating EDP establishments. The next four leading shellfish species bought by the participating EDP establishments were oysters, crawfish, scallops, and blue crabs. The second cluster of shellfish species purchased by participating seafood restaurants included snow crab, lobsters, squid, mussels, and clams. The third bundle of shellfish species served by the participating seafood restaurants included Dungeness crabs, king crabs, octopus, and roe.

Sources of Fish Species Handled by Mississippi Restaurants

Respondents were asked to indicate the supply source of the fish species their establishments bought in 2009 (Appendix B, question 2). Possible sources included Mississippi, other Gulf of Mexico states, other U.S. states, and other countries. Responses to this question will be used to identify the input sources of the economic impact model for the Mississippi seafood restaurant sector.

Catfish products served by 45.9% of the participating restaurants were mostly purchased from Mississippi suppliers. Approximately 39.7% of the Mississippi EDP businesses bought catfish products from sources within the state, 5.8% bought from other Gulf of Mexico states, 12% purchased from other states, and 0.7% purchased from sources outside of the U.S. Local and external sources of the major fish products served by the participating Mississippi EDP businesses are shown in Table 6.

Sources of Shellfish Species Handled by Mississippi Restaurants

Respondents were asked to specify the supply source of the shellfish species their establishments bought in 2009 (Appendix B, question 2). Sources included Mississippi, other Gulf of Mexico states, other states, and other countries. Answers to this question will point to the sources of inputs of the economic impact model for the Mississippi seafood restaurant sector.

More than half of the shrimp products served by 57.9% of the Mississippi EDP businesses that participated in the survey were from Mississippi suppliers.

Table 6. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011 by species of fish products bought in 2009 and source.

Fish species	Percent that bought species	Percent that bought species from Mississippi	Percent that bought species from other Gulf state	Percent that bought species inside the U.S.	Percent that bought species outside the U.S.
Catfish	45.9	39.7	5.8	12.0	0.7
Tilapia	18.8	5.5	3.8	7.5	4.8
Salmon	17.8	1.7	3.4	11.3	4.5
Tuna	13.7	3.1	4.1	4.1	4.5
Snapper	12.3	4.1	7.2	2.1	2.1
Flounder	10.3	5.8	3.8	1.7	0.7
Mahi-Mahi, Dolphin fish	8.6	1.7	3.8	2.4	1.4
Grouper	8.2	1.7	4.8	1.4	1.4
Cobia, Lemonfish	5.1	2.7	3.4	0.0	0.0
Red Drum	4.1	2.1	2.1	0.0	0.0
Sea Trout	3.4	1.0	2.4	0.7	0.0
Pollock	2.7	0.0	0.3	0.7	1.0
Black Drum	2.4	0.3	2.1	0.0	0.0
Cod	2.1	0.0	0.0	1.7	0.3
Mullet	0.7	0.3	0.3	0.0	0.0
Haddock	0.3	0.0	0.0	0.3	0.0
Others	3.8	0.3	0.7	2.4	1.7

Approximately 30.8% of the Mississippi restaurants bought from sources within the state, 22.9% purchased from other Gulf of Mexico states, 20.9% obtained them from sources in other states, and 12% were supplied by foreign sources. The domestic and foreign sources of the other major shellfish products served by the participating Mississippi EDP enterprises are shown in Table 7.

Annual Seafood Expenditures by Mississippi Restaurants

Respondents were asked to indicate how much they paid for all seafood purchases in 2009 (Appendix B, question 3). Answers to this question will be used to define the aggregate demand for seafood products by Mississippi EDP sectors. We hypothesized that the amount of seafood products purchased in 2009 would have been influenced by the type of eating experience, location of business, and size of business.

Annual seafood purchases of participating Mississippi EDP businesses in 2009 averaged $36,078, with standard error of $3,778. However, 31.8% of the participating firms did not serve seafood (Table 8). Approximately 64.4% of the participating businesses reported that they bought seafood products in 2009, amounting to at least $25,000, as part of their menu choices. When considering only the businesses that served seafood in

Table 7. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011, which bought shellfish products in 2009, by species and source.

Shellfish species	Percent that bought species	Percent that bought species from Mississippi	Percent that bought species from other Gulf state	Percent that bought species inside the U.S.	Percent that bought species outside the U.S.
Shrimp	57.9	30.8	22.9	20.9	12.0
Oysters	26.4	14.7	17.8	8.2	0.7
Crawfish	19.9	6.9	11.3	4.8	5.1
Scallops	14.7	4.1	2.7	7.5	1.7
Blue Crab	8.6	6.5	4.1	1.0	1.4
Snow Crab, Opilio	7.2	0.7	0.0	4.8	2.4
Lobsters	7.2	0.3	0.7	5.1	1.0
Squid, Calamari	6.8	1.7	1.0	2.7	2.7
Mussels	5.1	0.7	1.0	2.4	1.7
Clams	5.1	1.4	0.7	3.4	0.7
Dungeness Crab	3.4	1.0	0.3	1.7	0.3
King Crab	3.1	0.7	0.7	1.7	0.7
Octopus	1.4	0.0	0.3	1.0	0.3
Roe	1.4	0.3	0.0	0.7	0.7
Others	1.0	0.0	0.3	0.7	0.7

Table 8. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011 by total amount of all seafood purchases in 2009.

Total seafood purchases	Number of establishments	Percent of total number of establishments
Less than $25,000	109	37.3
$25,000 to $50,000	19	6.5
$50,001 to $75,000	25	8.6
$75,001 to $100,000	3	1.0
$100,001 to $125,000	7	2.4
$125,001 to $150,000	1	0.3
$150,001 to $175,000	5	1.7
$175,001 to $200,000	2	0.7
$200,001 to $225,000	3	1.0
$225,001 to $250,000	1	0.3
Above $250,000	13	4.5
Did not buy seafood	93	31.8
No answer	11	3.8
Total	292	100.0

2009, the annual seafood expenditures were $53,926, with a standard error of $5,176. The analysis of variance results showed that seafood spending was significantly affected by the type, location, and size of the EDP businesses.

Average seafood expenditures by EDP firms located in the Mississippi Gulf Coast were significantly higher than expenditure by businesses in noncoastal counties. Coastal establishments purchased more seafood products, averaging $83,446 per year, with a standard error of $15,896. Among noncoastal establishments, annual seafood purchases averaged $28,896, with a standard error of $3,414.

Substantial variations were observed in the seafood purchases of full-service and limited-service restaurants. FSR establishments purchased relatively more seafood products, averaging $45,180 per year, with a standard error of $4,907. Among the LSR establishments, annual seafood purchases averaged $11,281, with a standard error of $3,468.

Large EDP businesses paid more for seafood products than small EDP businesses. Super-large EDP establishments with AGS above $1 million spent $96,039 per year, with a standard error of $15,617. Among the large EDP establishments with AGS between $500,001 and $1,000,000, annual seafood purchases averaged $58,424, with a standard error of $11,798. The medium-sized EDP establishments with AGS between $200,001 and $500,000 spent $30,354, with a standard error of $5,531. The small firms with AGS below $200,000 paid an average of $15,132 for seafood products, with a standard error of $3,142.

In-State Sources of Seafood Products Handled by Mississippi Restaurants

Respondents were asked to indicate what percent of their seafood purchases in 2009 were from Mississippi (Appendix B, question 4). Answers to this question will be used to specify the local components of the economic impact models of the Mississippi EDP sectors. We hypothesized that the decision to purchase seafood products from Mississippi suppliers in 2009 would be influenced by the type of eating experience, location of business, and size of business.

Almost all participating EDP firms that served seafood in 2009 bought some fish and shellfish products from Mississippi sources. About 25% of participating firms bought less than 20% of their seafood supply from Mississippi suppliers. Approximately 17% of the responding establishments bought 80–100% of their seafood supply form Mississippi sources (Table 9).

Annual seafood purchases of participating EDP companies from Mississippi suppliers averaged 44.42% of their seafood requirements in 2009, with a standard error of 2.41%. The analysis of variance results showed that the percent of seafood purchases from Mississippi were not significantly different between the full-service restaurants and the limited-service restaurants. There were also no substantial variations between participating EDP establishments in coastal and noncoastal counties.

Larger EDP businesses bought a relatively smaller percentage of their seafood purchases from Mississippi than small establishments. Super-large establishments with AGS above $1 million purchased 25.48% of their seafood in 2009 from Mississippi, with a standard error of 3.43%. Among the large establishments with AGS

between $500,001 and $1 million, seafood purchases from Mississippi averaged 44.86%, with a standard error of 5.33%. Medium-sized establishments with AGS between $200,001 and $500,000 bought 45.74% of their seafood supply from local sources, with a standard error of 4.51%. Small firms with AGS below $200,000 purchased 53.7% of their seafood products from local Mississippi sources, with a standard error of 4.79%.

Out-of-State Sources of Seafood Handled by Mississippi Restaurants

Respondents were asked to specify what percentage of their seafood purchases in 2009 were from other Gulf of Mexico states (Appendix B, question 5). Answers to this question will be used to specify the out-of-state components of the economic impact models of Mississippi EDP sectors. We hypothesized that the decision to purchase seafood products from other Gulf of Mexico states in 2009 would be influenced by the type of eating experience, location of business, and size of business.

Annual seafood purchases of participating EDP companies from other Gulf states averaged 31.28%, with a standard error of 2.19%. Analysis of variance results showed that the percent of seafood purchases in 2009 from other Gulf of Mexico states was not significantly different among EDP establishments with different annual gross sales. Likewise, there were no substantial variations between establishments in coastal and noncoastal counties.

The percent of seafood purchases in 2009 from other Gulf States was significantly different between the full-service restaurants and the limited-service restaurants. FSR establishments bought an average 33.44% of their seafood supplies from other Gulf States, with a standard error of 2.46%. LSR businesses conducted an average 19.13% of their seafood transactions with other Gulf states, with a standard error of 4.13%.

Expenditures on Major Species by Mississippi Restaurants

Respondents were asked to specify what percent of their seafood purchases in 2009 were allocated to each of the five major species (Appendix B, question 6). Answers to this question will be used to specify the major species breakdown of the economic impact models of the Mississippi EDP sectors. We hypothesized that the joint decisions to allocate total expenditures to finfish, shrimp, oysters, crab, and other species would be influenced by the type of eating experience, location of business, and size of business.

Expenditures on Finfish Products — Expenditures on finfish species, primarily catfish, tilapia, salmon, tuna, and snapper, were 35.42% of all seafood purchases by participating EDP establishments that served these products in 2009 (Table 10). The standard error of the percent of finfish species to all seafood purchases was 2.71%, with a lower bound of 30.06% and an upper bound of 40.79%. The expenditure share spent on finfish products relative to other major species was significantly different by type of establishment.

Significant differences in the percent of seafood purchases allocated to finfish species were observed between full-service and limited-service restaurants. Full-service restaurants allocated 30.48% as compared to 55.5% spent by the limited-service restaurants.

GLM results showed that the percent of seafood purchases in 2009 devoted to finfish species was not significantly different among EDP establishments with different annual gross sales. We discovered no substantial variations in the percent of seafood purchases allocated to finfish species between participating EDP establishments in coastal and noncoastal counties.

Expenditures on Shrimp Products — Shrimp products comprised 43.25% of the total seafood

Table 9. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011 by percent of total seafood purchases in 2009 from Mississippi and other Gulf of Mexico states.

Percent of total seafood purchases	Purchases from Mississippi		Purchases from other Gulf states	
	No. of establishments	Percent of total	No. of establishments	Percent of total
Less than 20%	73	25.0	85	29.1
21% — 40%	27	9.2	25	8.6
41% — 60%	20	6.8	20	6.8
61% — 80%	20	6.8	17	5.8
81% — 100%	50	17.1	20	6.8
Did not buy seafood	102	34.9	13	4.5
No answer	0	0.0	112	38.4
Total	292	100.0	306	100.0

purchases by participating EDP business in 2009 (Table 10). The standard error of the percent of shrimp purchases to all seafood purchases was 2.59%, with a lower bound of 38.13% and an upper bound of 48.37%. GLM results showed that the expenditure share spent on shrimp products relative to other major species was significantly different by type of establishment.

Significant variations in the percent of the contribution of shrimp products to total seafood purchases in 2009 were observed between the full-service and limited-service restaurants. The full-service restaurants spent 47.29% as compared to 27.44% of the total seafood budget expended by the limited-service restaurants to shrimp products.

Results showed that the percent of seafood purchases in 2009 devoted to shrimp products was not significantly different among EDP establishments with different levels of annual gross sales. There were also no extensive disparities among EDP firms located in coastal and noncoastal counties.

Expenditures on Oyster Products — Purchases of oyster products contributed an average 7.6% to the total seafood budgets of participating EDP businesses in 2009 (Table 10). The standard error was 1.15%, with a lower bound of 5.32% and an upper bound of 9.89%. GLM results showed that expenditures on oyster products relative to other major species were not significantly different by business type, location, and size.

Expenditures on Crab Products — The budget for crab products added an average 5.16% to the total seafood expenditures of participating EDP businesses in 2009 (Table 10). The standard error was 0.98%, with a lower bound of 3.22% and an upper bound of 7.11%. GLM results showed that expenditures on crab products relative to other major species were significantly different by location of establishments. There were no significant differences in the budget for oyster products among different types and sizes of EDP businesses.

Substantial variations were discovered in the percent of seafood purchases allocated to crabs by establishments in coastal and noncoastal counties. Businesses located in coastal counties spent 11.96% of their seafood budgets on crab products. Participating EDP firms in noncoastal counties allocated 3.95% of their entire seafood budgets to crab products.

Full-Time and Part-Time Employees Hired by Mississippi Restaurants

Respondents were asked to specify the number of full-time and part-time workers employed at their establishments in 2009 (Appendix B, question 7). Answers to this question will be used to estimate the direct employment components of the economic impact models of the Mississippi EDP sectors. We hypothesized that employment decisions would be influenced by the type of eating experience, location of business, size of business, and whether the business served seafood.

Full-Time Workers — There were 13.5 full-time workers (FTW) employed in a typical EDP business in 2009 (Table 11). The standard error was 3.01 workers, with a lower bound estimate of 7.56 workers and an upper bound estimate of 19.44 workers. GLM results showed that the number of FTW relative to the number of part-time workers was significantly different among the different types and sizes of participating businesses. There were no significant variations in the number of FTW attributable to the location of businesses and whether they served seafood.

Results of the survey showed that participating full-service restaurants hired more full-time workers than the limited-service restaurants. The number of FTW employed by full-service restaurants in 2009 averaged

Table 10. Percent distribution by major seafood species of the total seafood purchases in 2009 by Mississippi eating and drinking places that participated in the survey conducted from May to December 2011.

Major species	Means of the percent of purchases	Standard error of the percent of purchases	Lower bound of the percent of purchases	Upper bound of the percent of purchases
Finfish	35.42	2.71	30.06	40.79
Shrimp	43.25	2.59	38.13	48.37
Oyster	7.60	1.15	5.32	9.89
Crab	5.16	0.98	3.22	7.11
Other	8.88	1.71	5.50	12.27

Table 11. Number of full-time and part-time workers employed at the Mississippi eating and drinking places that participated in the survey conducted from May to December 2011.

Sector	Number of businesses	Full-time workers		Part-time workers	
		Mean	Standard error	Mean	Standard error
Type of establishment:* **					
Full-service restaurant	174	14.10	3.15	9.47	1.23
Limited-service restaurant	65	4.83	0.98	5.27	1.19
Eating and drinking places	2	N.A.	N.A.	N.A.	N.A.
Total	241	13.50	3.01	9.60	1.62
Size of business (annual gross sales):* **					
Small (less than $200,000)	74	2.26	0.47	2.38	0.37
Medium ($200,001 to $500,00)	69	4.39	0.48	5.65	0.75
Large ($500,001 to $1,000,000)	44	19.14	10.05	8.61	1.41
Super large (more than $1,000,000)	38	49.82	13.70	33.55	9.13
Total	225	14.24	3.22	9.90	1.73

*** Significant at 0.001.

14.1 workers per establishment (Table 11). Limited-service restaurants hired relatively fewer workers on a full-time basis, averaging 4.83 workers per establishment.

The larger restaurants that participated in the survey signed up more workers in their payroll in 2009 as compared to the small-sized restaurants. The small restaurants engaged 2.26 workers per establishment on a permanent basis, as Table 11 shows. The medium-sized restaurants provided full-time employment for 4.39 workers per establishment. The large-sized restaurants kept in their payroll an average 19.14 full-time workers per establishment. The super-large restaurants maintained a full-time workforce averaging 49.82 workers per establishment.

Part-Time Workers — In addition to the 13.5 full-time workers per establishment, participating restaurants hired an additional 9.6 part-time workers (PRT) per establishment. The standard error was 1.62 workers, with a lower bound estimate of 6.4 workers and an upper bound estimate of 12.81 workers. GLM results showed that the number of PTW relative to the number of FTW was significantly different among the different types and sizes of participating businesses. There were no considerable variations in the number of PTWs employed due to business location of and whether they served seafood.

Survey results showed that participating full-service restaurants also hired more PTW than limited-service restaurants to augment their full-time workforce. The number of PTW employed by full-service restaurants in 2009 averaged 9.47 workers per establishment (Table 11). Limited-service restaurants engaged relatively fewer workers on a part-time basis, averaging 5.27 workers per establishment.

Larger restaurants that participated in the survey also employed more workers in 2009 as compared with small restaurants to supplement their full-time workforce. Small restaurants hired 2.38 workers per establishment on a permanent basis (Table 11). Medium-sized restaurants provided employment to 5.65 PTW per establishment. Large restaurants contracted an average 8.61 PTW per establishment. Super-large restaurants provided full-time jobs to an average of 33.55 workers per establishment.

Annual Gross Sales of Mississippi Restaurants

Respondents were asked to specify the total annual gross sales of their establishments in 2009 (Appendix B, question 8). Answers to this question will be used to estimate the direct output components of the economic impact models of the Mississippi EDP sectors. Total annual gross sales in 2009 were hypothesized to be influenced by the type of eating experience, location of business, and whether the business served seafood.

EDP establishments that participated in the survey were generally small or medium-sized businesses. Small businesses with total annual gross sales below $200,000 comprised 28.8% of all the participating establishments (Table 12). Almost 26% consisted of medium-sized restaurants, with total annual gross sales between $200,001 and $500,000. Results of the cross-tabulation showed that business size and total annual gross sales were not significantly different among the different types and locations of businesses or whether they served seafood.

Table 12. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011 by size of business or total annual gross sales in 2009.

Size of business (total annual gross sales)	Number of establishments	Percent of establishments
Small (less than $200,000)	84	28.8
Medium ($200,001 to $500,00)	75	25.7
Large ($500,001 to $1,000,000)	47	16.1
Super large (more than $1,000,000)	39	13.4
No answer	47	16.1
Total	292	100.0

Revenue Shares of Seafood Sales of Mississippi Restaurants

Respondents were asked to specify what percent of their total annual gross sales consisted of seafood products in 2009 (Appendix B, question 8). Answers to this question will be used to estimate the direct output component of the economic impact model of the Mississippi seafood restaurant sector. Percent revenue shares of seafood sales to the total annual gross sales was hypothesized to be influenced by type of eating experience, location of business, size of business, and whether the business served seafood.

Results of the analysis of variance showed that the percent revenue share of seafood sales in 2009 was significantly different by type of eating establishment and whether the business served seafood. There were no significant differences in the seafood revenue shares observed among different locations and sizes of participating businesses.

Gross revenue shares of seafood sales to total annual gross sales of the participating EDP businesses averaged 17.82% in 2009 with a standard error of 1.33%. About 33.9% of the participating EDP firms did not offer seafood items in their menus, as Table 13 shows. Approximately 62.7% of the participating EDP businesses reported that they served seafood products in 2009. When considering only those EDP businesses that served seafood in 2009, the net revenue shares of seafood sales to total annual gross sales averaged 26.46% with a standard error of 1.64%. Survey results showed that the revenue shares of seafood sales to total gross sales were significantly higher among full-service restaurants. Revenue shares of full-service restaurants in 2009 averaged 22.12%. Participating limited-service restaurants generated seafood sales averaging 6.98% of total annual gross sales.

Table 13. Mississippi eating and drinking places that participated in the survey conducted from May to December 2011 by percent of total seafood sales to total annual gross sales in 2009.

Percent of seafood sales to total annual gross sales	Number of establishments	Percent of establishments
No seafood sales	99	33.9
Less than 20%	92	31.5
21% – 40%	50	17.1
41% – 60%	24	8.2
61% – 80%	7	2.4
81% – 100%	10	3.4
No answer	10	3.4
Total	292	100.0

SUMMARY AND RESEARCH IMPLICATIONS

There were three objectives that this survey aimed to achieve: (1) to determine the major species of seafood products handled; (2) to determine the sources of seafood products served; and (3) to estimate the annual gross sales and direct employment generated by the seafood restaurant sector. These results will be used in estimating the economic impacts of the Mississippi seafood restaurant sector in terms of total output, income, employment, and major seafood species sold. Updated economic impact estimates by major species are needed by the state regulatory agencies to help manage these specific commercial fisheries.

Results of this survey serve as benchmark information about the restaurant sector in estimating how natural or technological disasters impact the industry. Changing perceptions about local seafood arising from these disasters also have serious effects on the economic sector. A follow-up survey is strongly recommended to determine the economic changes in the restaurant sector arising from the recent oil spill that impacted the Gulf of Mexico region.

A total of 292 restaurants operating in Mississippi completed the survey in summer and fall 2011, representing a gross response rate of 19.5%. Results of the survey indicated that more than two-thirds of the randomly selected restaurants that completed the survey reported that they served seafood products in 2009. The lists of fish and shellfish species preferred by seafood restaurants are important since several of these species are harvested from state and federal waters or grown in fish farms in the Gulf of Mexico states.

The leading fish species purchased by participating establishments was catfish, followed by tilapia, salmon, tuna, and snapper. The second group of fish species purchased by participating seafood restaurants included mahi-mahi, grouper, cobia, red drum, and sea trout. The third cluster of fish species served by the seafood restaurants that participated in the survey included pollock, black drum, cod, mullet, and haddock.

Shrimp was the top shellfish species purchased by the participating establishments, trailed by oysters, crawfish, scallops, and blue crabs. The second cluster of shellfish species purchased by participating seafood restaurants included snow crabs, lobsters, squid, mussels, and clams. The third bundle of shellfish species served by the seafood restaurants that participated in the survey included Dungeness crabs, king crabs, octopus, and roe.

Among the restaurants that served seafood in 2009, annual seafood expenditures averaged $53,926. Annual seafood purchases by participating restaurants from Mississippi suppliers averaged 44.42% of their total seafood requirements. Annual seafood purchases by participating restaurants from other Gulf of Mexico states averaged 31.28% of total seafood expenditures. Expenditures on finfish species, primarily catfish, tilapia, salmon, tuna, and snapper, consisted 35.42% of all the seafood purchases by participating establishments that served these products. Purchases of shrimp products comprised 43.25% of total seafood purchases by participating business. Purchases of oyster products contributed an average 7.6% to the total seafood budgets of participating businesses. The budget for crab products added an average of 5.16% to total seafood expenditures of participating businesses.

Establishments that participated in the survey were generally small or medium-sized businesses. Small businesses with total annual gross sales below $200,000 comprised 28.8% of all participating establishments. More than 25% were medium-sized restaurants with total annual gross sales between $200,001 and $500,000. There were 13.5 full-time workers employed in a typical business in 2009. In addition, participating restaurants hired an additional 9.6 part-time workers per establishment. Among businesses that served seafood in 2009, the net revenue shares of seafood sales averaged 26.46% of the total annual gross sales.

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