

Economic Impact of Commercial Shrimp Landings on the Economy of Texas

WADE L. GRIFFIN and LONNIE L. JONES

INTRODUCTION

The Gulf Coast shrimp resource supports a large and expanding industry. The value of 1971 shrimp landings was estimated at over \$136 million, more than 80 percent of the total U.S. shrimp catch¹. Commercial fish landed in Texas in 1971, most of which was shrimp, was valued at \$70 million. Shrimp landed in Texas is a very large percentage of the Gulf of Mexico landing. This implies that the waters adjacent to Texas are quite productive for shrimp and that these shrimp are important to the economy of Texas.

The economic contribution that shrimp producers make to the local economy and to the state of Texas is of interest since the resources of the Gulf and bays of Texas are used by many groups for both recreational and commercial purposes. Each year various groups increase their demand for the resources of the Gulf and bays. Since the Gulf and bays do not have an infinite capacity to satisfy this increased demand, the various groups become competitive for the resource. As groups become more and more competitive, one may conclude that some or all of these groups will be limited in their use of the resource. For example, if waste disposal occurs to the extent that other activities are precluded, the disposers of waste will have, in effect, appropriated the resource. The same concept applies when any special interest group uses the Gulf or bays to the exclusion of others.

The use of the Gulf and bay resources

¹Griffin, Wade L., John P. Nichols, and Ronald D. Lacewell, "Trends in Catch/Effort Series: Gulf of Mexico Shrimp Fishery." Texas Agricultural Experiment Station, Department of Agricultural Economics, Texas A&M University, College Station, Tex. Dec. 1973, 85 p. Unpublished report, National Marine Fisheries Service, NOAA, under NMFS Contract No. 03-3-042-19.

could be decided either by such a process of elimination or by public policy. Development of public policy means that state and local organizations and federal agencies will be confronted with decisions which may affect the shrimp resource as well as other resources of the Gulf. Among the factors that should be considered in decision making is the economic contribution that each group of users makes toward the welfare of society. This report focused on the economic contribution that shrimp producers make to Texas in order to evaluate the potential economic value of shrimp production².

PROCEDURE, STUDY AREA, AND DATA DESCRIPTION

Procedure

The statewide impact from shrimp production is estimated through economic multiplier analysis. Conceptually, the multiplier can be explained as follows. Shrimp fishermen buy various goods and services in order to fish for shrimp. They also receive wages that are spent to support their families. The people who provide these goods and services use a portion of this payment to pay wages and salaries and buy material to replace the goods purchased by the shrimp fishermen. These purchases in turn will result in more purchases. The economic impact of the initial purchases made by shrimp fishermen permeates the economy. Multipliers are a condensed measure of how much economic activity is generated by such initial purchases. These multipliers have been estimated and are available from input-output models recently developed

²For the complete report, see Sea Grant publication TAMU-SG-75-204, Center for Marine Resources, Texas A&M University, College Station, TX 77843.

within Texas (Grubb, 1973 a, b). Multipliers that are useful to the understanding of the details of how initial economic activities affect the economy and that are used in this study are: output, income, and employment. The shrimp industry output multiplier, as used in this report, is an estimate of the total amount of output from all sectors of the economy required to support one dollar of output in the shrimp industry. The income multiplier is an estimate of the total quantity of income (salaries, wages, profits and rent) paid to households per dollar income payment made by the shrimping industry. The shrimp industry employment multiplier is an estimate of the total employment in the economy that results from shrimp industry output expansion sufficient to require an additional employee to be hired.

Data Description

The data used in this study are from two sources. First, 5-year series of production- and price-data collected by the National Marine Fisheries Service (NMFS) and analyzed by Griffin³ provided estimates of the value and total weight of shrimp landed in Texas ports during the 1967-1971 period. Second, output, income, and employment multipliers were adapted from the 1967 input-output model of the State of Texas (Grubb, 1973b⁴).

³Griffin, Wade L., David Smith, Ronald D. Lacewell, and John P. Nichols, "National Marine Fisheries Service Shrimp Landings Description of Data Availability." Department Information Report No. 73-3, Texas Agricultural Experiment Station, Department of Agricultural Economics, Texas A&M University, College Station, Tex. Jan. 1973, 17 p.

⁴Multipliers were actually developed for "fisheries." However, since the value of shrimp landed constitutes approximately 90 percent of the total value in the "fisheries" landings in Texas, these multipliers are appropriate for estimating the impact of shrimp industry output.

Wade L. Griffin and Lonnie L. Jones are, respectively, assistant professor and associate professor, Department of Agricultural Economics, Texas A&M University, and economist with the Texas Agricultural Extension Service, College Station, TX 77840. Research for this paper, Technical Article 11697 of the Texas Agricultural Experiment Station, was funded in part by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service and Sea Grant Program and by the Texas Agricultural Experiment Station.

These data were used in combination to develop the estimates of total output, income and employment impacts for the state, that result from output and purchases made by the shrimp industry.

TOTAL OUTPUT OF THE SHRIMP INDUSTRY

Table 1 shows the total output of shrimp in pounds and value for the state of Texas for the period 1967-1971. Production and value figures for 1971 are used in this analysis since they were the most recent figures available at the time

Table 1.—Pounds and value of shrimp landed in Texas from 1967 through 1971.

Year	Total	
	Pounds ¹	Value ²
1967	63,663	\$45,968
1968	52,333	45,872
1969	44,485	43,024
1970	55,402	34,373
1971	54,230	63,921

¹Heads-off weight in hundreds of pounds.

²Values listed in thousands of dollars.

this study was conducted and because shrimp output for that year corresponds closely to an average year's production⁵. The total output of the Texas shrimp industry in 1971 was 54.2 million pounds and its total value was \$63.9 million.

DIRECT IMPACT OF THE TEXAS SHRIMP INDUSTRY

The direct impact of the shrimp industry on the remainder of the economy is demonstrated by the value of its estimated purchases from all other major economic sectors. Table 2 shows how the value of shrimp industry output in 1971 was used for purchases of productive inputs such as food processing, petroleum, shipbuilding, households, taxes, depreciation, and goods and services imported into Texas. Since the shrimp industry is labor-intensive, the largest component in each case was payments to households for labor and managerial services. For Texas, it is estimated that from a total value of production of \$63.9 million, the industry paid \$24.0 million to households or over 37 percent (Table 2). Significant purchases of inputs and services also were

⁵Production in 1971 is approximately equal to the 5-year average (1967-71). This is also evidenced in a study by Griffin, et al., (footnote 1, Figure 21, p. 41).

made from industries such as food processing (\$2.1 million), petroleum products (\$2.8 million), shipbuilding (\$5.6 million) and others.

Table 2 indicates only the direct purchases by the shrimp industry from the economies of the State. Hence, they indicate only part of the total impact of the industry on the economy. Direct purchase by the shrimp industry from input-supplying industries stimulates output and subsequent purchases by those industries. In turn, these output changes give rise to more secondary and tertiary output responses in related industries. These indirect impacts, as well as the output increases induced by expenditures made by employees who receive income from the shrimp industry, are included in estimates of the aggregate (direct, indirect, and induced) economic impact and are expressed in terms of output, income, and employment multipliers.

AGGREGATE ECONOMIC IMPACT OF THE TEXAS SHRIMP INDUSTRY

Economic Output

The economic impact of the Texas shrimp industry is estimated on the basis of both the per-dollar output and the aggregate dollar output of shrimp. As shown in the second column of Table 3, \$1.00 of output by the shrimp industry has a total economic output impact on the Texas economy of \$3.08. This includes \$1.00 of output by the

shrimp industry and \$2.08 of indirect and induced output by supporting industries. Related production by major sectors of the economy includes: 10 cents for food processing, 7.5 cents for petroleum products, 10.5 cents for wholesale trade services, 19.0 cents for retail trade, 13.3 cents for financing, etc. to support \$1.00 of shrimp industry production. These are total outputs required of each industry, including secondary and tertiary production requirements per dollar of shrimp industry output. Total income payments to households by all industries of about 89 cents are stimulated by the initial \$1.00 of shrimp production. Payments go to households throughout the state from all industries in the form of salaries, wages, profits, and rents as a result of \$1.00 of shrimp production and the outputs required by supporting industries.

The total value of shrimp production to commercial shrimpers for Texas landed shrimp in 1971 was estimated to be \$63.9 million. The total estimated output impact of this production on each major sector of the economy is presented in column 3 of Table 3. The aggregate impact values are estimated by multiplying the total value of shrimp output by the output impact on each major industry per dollar of shrimp output. For example, it is estimated that \$63.9 million output value stimulated \$6.5 million value of output in the food processing industry, \$4.8 million in petroleum products, \$12.1 million in retail trade, \$56.8 million in household income, etc. In total, the estimated direct,

Table 2.—Direct purchases by the shrimp industry from major economic sectors of Texas, 1971.

Industry	Texas (thousands)
Agriculture and forestry	\$ 9
Shrimp	589
Crude oil and natural gas	57
Food processing	2,072
Textiles	628
Wood and paper	8
Paints and cleaners	76
Petroleum products	2,847
Shipbuilding	5,611
Other manufacturing	150
Transportation	1,590
Communications	126
Utilities	132
Wholesale trade	2,063
Retail trade	1,046
Finance	1,003
Insurance	1,905
Services	554
Households	23,961
Property payments	7,243
Taxes	1,471
Depreciation	5,641
Imports	5,138
Total	\$63,921

Table 3.—Economic impact of the shrimp industry's \$63.9 million of output on the economy of Texas, 1971.

Industry	Impact per dollar of shrimp output	Aggregate impact by the shrimp industry (millions)
Agriculture and forestry	\$0.0477	\$ 3.05
Shrimp	1.0000	63.92
Crude oil and natural gas	.0433	2.76
Food processing	.1016	6.49
Textiles	.0163	1.04
Wood and paper	.0260	1.66
Paints and cleaners	.0025	.16
Petroleum products	.0753	4.81
Shipbuilding	.0891	5.69
Other manufacturing	.0634	4.05
Transportation	.0618	3.95
Communications	.0214	1.36
Utilities	.0433	2.77
Wholesale trade	.1045	6.68
Retail trade	.1898	12.13
Finance	.1334	8.52
Services	.1762	11.26
Households	.8896	56.84
Total	\$3.0852	\$197.12

indirect, and induced impact on the Texas economy of the value of 1971 shrimp production was \$197.1 million.

As these results indicate, the contribution of the Texas shrimping industry to the State's economy is significant. Almost \$200 million is generated as a result of direct production, purchases made from other industries, and household income stimulated by the shrimp industry. A loss or reduction in output by this industry would significantly affect a large number of economic sectors in the Texas economy particularly those in close proximity to the shrimp resource along the Texas Gulf Coast region. Those sectors experiencing the most significant reductions would be: the shrimp industry itself; households; food processing; and petroleum products.

Income and Employment

The amounts of personal income and employment created by the shrimp industry are of importance in evaluating their contribution to the total economic welfare of the State. As indicated in Table 3, about \$56.8 million of personal income is created throughout the State's economy by economic activity in the shrimp industry. This income value results both from direct payments to workers in the shrimp industry (estimated to be 37 cents⁶ of each dollar of output) and indirect income payments (estimated to total 52 cents⁷ per dollar of shrimp output) that are made by other industries as they produce in response to production requirements of the shrimp industry. Since the shrimp industry is relatively labor-intensive, and since it is closely interrelated with other producing sectors of the economy, its impact on personal income is significant. It is estimated that in 1971, the shrimp industry paid a total of \$24.0 million directly to households and further stimulated an additional \$32.8

million of income payments to households from industries in the remainder of the Texas economy. The income multiplier of the shrimp industry is estimated to be 2.37 ($\$56.8 \div \$24.0 = \$2.37$).

The relationship between employment in the shrimp industry and employment in the total economy is estimated with the use of the shrimp industry employment multiplier. The employment has been estimated at 1.22 (Murrell, Geenens, and McMichael, 1972). This indicates that if production in the shrimp industry is increased enough such that one additional person is employed in the shrimp industry, total employment in the economy will rise by 1.22 persons. The additional 0.22 employees would be employed in industries that respond with increases in output of goods and services utilized in the shrimp industry.

The aggregate employment impact of the shrimp industry in 1971 is estimated from data available on the number of persons employed per dollar of output and the total dollar value of 1971 shrimp output. The most recent information available indicates that just less than one person (0.78) is employed for each \$10,000 of output in the Texas shrimp industry (Murrell et al., 1972). Hence, the total value of 1971 output, estimated at \$63.9 million means that approximately 5,000 persons were employed directly in the shrimp industry. Moreover, as a result of the multiplier effect, giving rise to secondary and tertiary employment in related industries, it is estimated that the total employment impact on the Texas economy was just over 6,000 employees⁸ ($4,986 \times 1.22 = 6,083$).

As with output and income, these employment effects would be concentrated primarily in close proximity to the shrimp resource—the Texas Gulf

Coast region. However, some secondary and tertiary impacts of the industry would be distributed throughout all regions of Texas because of the regional interdependence in the state's economy.

SUMMARY AND CONCLUSIONS

The Gulf of Mexico is an important resource base for seafood production of which shrimp is the most valuable. The total amount of shrimp landed in Texas in 1971 was 54.2 million pounds with a value of \$63.9 million.

In total dollars, the estimated direct, indirect, and induced impact on the Texas economy from the \$63.9 million of 1971 shrimp production was estimated at \$197.1 million. The contribution to total economic welfare with respect to personal income was \$56.8 million and employment created was 6,083 jobs. About 80 percent of this aggregate statewide economic impact is concentrated in the Gulf coast region.

Increased demand by various groups for the resources of the Gulf and bays are causing ever-increasing pressure on local, state, and federal agencies for coastal zone management policies. If such policies are to be sound from the standpoint of the welfare of society as a whole, then economic information as developed in this study must be considered along with information on contributions made by other Gulf Coast resource users. The results of this analysis indicate that the commercial shrimp industry makes an important contribution to the economy of Texas particularly along the coastal region.

LITERATURE CITED

- Grubb, H. B. 1973. The structure of the Texas economy. Volume I. Office of the Governor, Office of Information Services, Austin, 202 p.
- _____. 1973. The structure of the Texas economy. Volume II. Office of the Governor, Office of Information Services, Austin, 366 p.
- Murrell, J. C., Jr., R. B. Geenens, and R. N. McMichael. 1972. An input-output model of the lower Rio Grande region of Texas. Office of the Governor, Office of Information Services, Austin, 169 p.

⁶From Table 2, Column 2 ($23,961 \div 63,921 = 0.37$).

⁷From Table 3, Column 3 ($0.89 - 0.37 = 0.52$).

⁸Assuming 100 percent of the employment impact is in the coastal counties, then this is approximately 0.6 percent of the total employment in the coastal counties of Texas.