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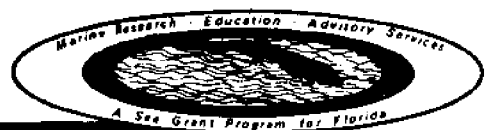
FLORIDA SEA GRANT PROGRAM

PRIMARY ECONOMIC IMPACT OF THE FLORIDA COMMERCIAL FISHING SECTOR

by Fred J. Prochaska and R. Allen Morris

Report Number 25

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COMMERCIAL FISHING SECTOR

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PRIMARY ECONOMIC IMPACT OF THE FLORIDA COMMERCIAL FISHING SECTOR

by

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INTRODUCTION

Commercial fishing is one of the many important uses made of Florida marine resources. Value of dockside landings is an indication of the economic value generated from using marine resources for commercial fish production. However, this is only the initial value attributable to the marine resource entering the commercial fishery. Additional sales, incomes and employment are generated in the economy which are not reflected in dockside values. Furthermore, dockside values are gross values and as such do not identify specifically important items such as incomes and sales generated directly by fishermen. These details and additional estimates are of extreme importance for several reasons.

Florida marine resources do not have an infinite capacity to satisfy increasing demands placed on them. There is increasing competition for the resources. Competition is between various users including commercial fishing, sport fishing, and boating, as well as competition among commercial fishermen. Allocation of marine resources can be sufficiently accomplished through the market place when private property rights are clearly defined. Since this is often not the case for marine resources, allocation may require decisions by public officials. They must determine use priorities. To determine priorities, several questions must be answered. With respect to commercial fisheries, these questions are: How important is the commercial fishing industry to other industries in the economy? What levels of income and employment are a direct result of commercial fishing activities? How is output and sales in all Florida industries affected by the commercial fishing industry? Answers to these questions provide the basic information required to determine the "benefits" and "costs" associated with the various uses made of Florida marine resources.

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The specific objectives of this report are to (1) identify the quantity and value of commercial marine landings for the 1972-1975 production period, (2) determine expenditures and sales directly generated by commercial marine fisheries, and (3) assess the economic impact in terms of sales, income, employment and output. The basic analysis and data reported in this publication will serve as an input into further research and numerous decision making activities by both the public and private sectors. The research provides a data base for evaluation of fishery management plans required by the Fishery Conservation and Management Act of 1976. Both state legislators and management personnel require this information when regulating specific fisheries and deciding on use priorities such as the allocation of fish between sport and commercial users. Industries supplying inputs to the commercial fishing industry may use the information as an indicator of the relative importance of individual fisheries.

The remainder of this report is organized into four sections. First, research procedures and definitions are discussed. In the second section, a review of current marine landings is presented. The third section contains estimates of the economic impact. The final section is a summary and conclusion of the report.

RESEARCH PROCEDURES AND DEFINITIONS

Economic Impact

One method of determining the economic value or importance of an industry to a national or regional economy is to estimate the economic impact of the industry on that economy. Economic impact may be defined as "the effect of a general change in a region's economy or the effect on the whole of a change in part of its economy" [15]. Each dollar invested by a given industry affects regional and/or national output, income, and employment. A change in investment will change these factors by an amplified amount. The magnitude of effect within an economy resulting from a change in part of the economy is governed by the degree of interdependency that exists among the various industries (sectors) within that economy. Economic impact, when considered in terms of output effect, shows the effect of changes in output in a particular industry or sector¹ on the output of all other industries or sectors in the economy. This effect consists of several "rounds" of impact. For example, the first round of impact involves only the industry of interest (primary industry) and the industries that directly interact with that particular industry (secondary industries). Subsequent rounds involve estimates based on the interaction of these secondary industries with other industries, and the interaction of these other industries with still other industries, until the effect originating in the designated primary industry is measured throughout the economy.

¹A "sector" is an aggregation of industries, and will be used interchangeably with "industry" in this study.

It should be understood that measurement of economic impact is not the same as estimation of gross regional or national product, which attempts to measure net changes in value and seeks to avoid double counting. Economic impact does include some double counting in the summation of the numerous and varied rounds of effect throughout the economy resulting from an initial change.

Primary Economic Impact

Primary economic impact is defined in this study as the direct economic effect resulting from economic activity in a given sector, industry, or sub-sector of an industry. However, it is not the same as "direct effect" used in input-output analysis. Primary economic impact is estimated as sales of the study sector plus expenditures for inputs by this sector. Sales represent the economic activity generated in the study sector and expenditures represent the total economic value of all goods and services purchased from other sectors in the economy. Expenditures are a measure of economic activity generated by the study sector in sectors where the expenditures are made. Therefore, the degree of interdependence between the study sector and other sectors in the economy is embodied in primary economic impact.

Primary economic impact, like total economic impact, is not the same as estimation of gross regional or national product, which measures net changes and avoids double counting. Primary economic impact does include some double counting of net changes in that it seeks to estimate economic activity generated rather than net changes in values of goods and services.

Primary economic impact differs from total economic impact in the estimation of interaction among sectors in an economy. For estimation of primary economic impact in this study, final demand was considered simply as demand for goods and services. Consequently, distinguishing between demand from consumers of retail products and consumers of wholesale products in the form of inputs to a production process (which originates as final demand) was not important for the purpose of this study.

Primary economic impact measures both the direct sales of the study sector to other sectors in the economy, and the inputs purchased by the study sector directly from all other sectors in the economy. It doesn't estimate the total economic activity resulting from interactions between the sectors selling inputs to the study sector and other sectors in the economy. However, the purchase price for an input represents the total economic value of that input. This reflects net changes in economic value between the sector selling the input and the sectors with which this "input-selling" sector interacts. Consequently, a partial representation of all economic activity generated (that portion reflected by net changes in value at each level) by the study sector is embodied in the primary economic impact estimate.

Total purchases of inputs by a given sector are often not known. Estimation of inputs purchased in proportion to a given volume of sales enables estimation of total input purchase requirements.

"Primary technical coefficients" in this study show dollar purchases of inputs per \$100 of output (sales) by the sector being analyzed. These coefficients are based on the assumption that there is a constant linear relationship between the purchases of a sector for inputs and the sales (outputs) of that sector. Primary technical coefficients are presented as "expenditures per \$100 sales" in the Empirical Analysis and Results and Estimated Impacts sections of this report. Economic impacts estimated and presented in this report are summarized as follows:

- 1) Primary economic impact is the direct economic effects resulting from economic activity in a given sector or industry. It is estimated as sales of the study sector plus expenditures for inputs by this sector. Primary economic impact for the commercial fishing sector is not necessarily restricted.
- 2) State output effect is the total sales generated in the state economy from changes in fish sales by fishermen in the Florida economy. It is calculated with a state output multiplier. State output multipliers for a particular sector show how much the value of total sales in all sectors of the state will change as the result of a change in sales of the study sector. Output multipliers for this study were obtained from the Florida input-output model. The effects are restricted to the state.
- 3) National output effect is the total sales generated in the national economy from changes in fish sales by fishermen in the Florida economy. It is theoretically the same as state output effect discussed above, and is calculated with a national output multiplier.

Estimation of the primary economic impact and income generated ("impact") by the commercial fishing sector required organization of data into budgets representing sales of fish and purchases of inputs associated with these sales. Crew wages and captains' salaries were considered part of income generated rather than expenditures. Sales less total expenditures was designated as income, which includes wages, salaries, payrolls, profits, etc. Profits were included in the income category because they may be used for personal income or invested back into the business at the discretion of the recipient.

Procedures

Cost and returns budgets. The nature of the commercial fish harvesting sector is such that only a few of the more than 80 reported species of finfish and shellfish landed in Florida are the main species sought. The remaining species are incidental catch resulting from the fishing effort directed at the main or "target" species. For example, more than 30 species are landed annually by Spanish mackerel and king mackerel fishermen and at least eight species are caught annually in the mullet fishery. Consequently, budgets were only needed for the target species. These budgets yielded sufficient data to estimate expenditures, income, and primary economic impact for all the other species. It should be noted that while all target species were in the group of "most valuable species" (1975 landings greater than \$1.0 million),

some most valuable species such as sea trout² were at least in part, incidental catches of other fisheries. Some species were also complimentary fisheries in that they were pursued in the "off" season of species normally fished. Consequently, value of the fishery is not necessarily an indication of whether it is a primarily sought-after (target) species or an incidental catch. Consultation with experienced commercial fishermen and professional marina personnel allowed determination of "target" species.

Cost and return budgets were previously estimated for five of the seven species designated as target species [1, 2, 7, 9, 13, 16, and 17]. These were red snapper and grouper (Appendices A1 - A3), mullet (Appendices A4 - A5), shrimp (Appendix A8), spiny lobster (Appendices A9 - A10), and blue crab (Appendices A11 - A12). Budgets for king mackerel (Appendix A6) and Spanish mackerel (Appendix A7) the other two target species, were developed through field work as part of this study [5,14].

Although estimates of expenditures by the Florida fishing sector were based on data from Florida commercial fishermen, there were no data available to determine which portions (if any) of the fishermen's expenditures were in Florida industries and which portions were to out-of-state industries. Consequently, total estimates of expenditures and primary economic impact are not restricted to Florida. However, it is estimated that only a small percentage of the expenditures were made directly to out-of-state industries. Therefore, most of the estimated primary economic impact applies specifically to Florida.

Adjustments for price changes. The varying dates of the available budgets required the use of wholesale and retail price indices to convert the data to 1975 dollars. The maximum time period updated was four years because the earliest budgets were completed in 1971. License fees, loans, and other similar fixed costs were assumed to change little, if any, over the four-year time period and were not altered unless information from the original budgets indicated they should be. Annual depreciation was calculated as the difference between original cost and salvage value divided by years of life. It was assumed that original cost and salvage values inflated through time at similar rates and thus would offset any effects of short-term inflation (four years maximum) on annual depreciation rates. Annual depreciation and interest on investment was adjusted for shrimp because 17 percent of shrimping equipment was replaced over the time period involved [7]. Depreciation estimated in the original budgets was used for the other principle fisheries.

Price indices were chosen based on the type of expenditure. For example, a petroleum products index was used for fuel, a food index was used for groceries, and a motor oil index was used for oil. In some instances, appropriate indices were more difficult to determine. A simple average of the indices for wood and concrete was used for lobster traps. A simple average of the indices for cotton products and man-made fiber textiles was used for nets because these are the primary construction materials for fishing nets. Wholesale price indices were normally used because fishermen purchase most inputs in relatively large quantities at wholesale prices. However, retail

²Sea Trout is an incidental catch some parts of the year and a main species or target catch other parts of the year. This is also true for some of the other species designated as incidental catch in this study.

price indices were used for insurance, groceries, bookkeeping and business services, and other items usually purchased at retail price levels. A wholesale price index for all commodities was used for bait.

The indices used to adjust expenditure items are reported with the cost and returns budgets for the seven major (target) species in Appendix A. The procedures used to update the budgets are more completely developed in the footnotes to the respective budgets in Appendix A.

Estimation of Impact. The cost and returns budgets developed and presented in Appendix A were the basis for the construction of "impact" tables. Impact tables were organized into categories of expenditures, sales, income, and primary economic impact. Expenditures, sales, income, and primary economic impact were computed per 100 pounds of fish landed and per \$100 value of fish landed (primary technical coefficients). Industries interacting with the commercial fishing sector are interested in how much commercial fishermen purchase from them per dollar unit of fish sales. Also, fishermen and wholesale fish dealers are interested in incomes generated or certain expenditures like ice or fishing gear per unit quantity of fish landed. Although these two estimates are related, including both estimates is more directly useful to a larger audience. When price of a given species is less than \$1.00 per pound, then expenditures, sales, income, and primary economic impact per 100 pounds of the species landed are less than per \$100 value of the species landed. When price of the species is greater than \$1.00 per pound, the reverse is true. Computing expenditures, sales, income, and primary economic impact per 100 pounds of fish landed and per \$100 value of fish landed enables estimation of the primary economic impact for any region or county in Florida if the quantity and/or value of fish landed in that region are known. Finally, state totals were calculated based on total quantity and value of Florida landings of specific species in 1975.

Impact tables differ from cost and returns budgets in that crew wages or shares were not included as expenditures but as part of income in the impact tables. Prices in the budgets usually differ from average Florida prices for a particular species because sample respondents received more or less than state averages. All sales computed for the impact tables were based on average Florida prices, values, and quantities. In instances where budgets contained sales of "other" fish and the species comprising "other" fish were not known, reported average prices for "other" fish in the budget were used as estimates of state average prices for "other" fish. Total state landings of "other" fish in any budget was calculated based on the proportion of "other" fish to the main (target) species in the budget.

When one species was landed by more than one fishery for which budgets were developed, the total state landings of the species were allocated to the budgeted fisheries according to the relative share of total state catch reported in individual budgets. Total quantity of other species and incidental catch was subtracted from total state landings not accounted for by the seven target species. The impact of this residual was determined by specific species' impact tables and combinations of species impact tables that best approximated expenditures for the species being analyzed. Total primary economic impact for the total Florida commercial fishing sector was estimated as the sum of all individual projections.

COMMERCIAL FISHING

Over 10,500 commercial fishermen land marine species in Florida [8]. Approximately 70 percent earn over 50 percent of their income from commercial fishing.³ These fishermen fished 1,841 vessels and 4,051 boats in 1974 [18].

During the last three years for which data were reported, 1973-1975, Florida fishermen landed an average of 167.1 million pounds valued at \$68.1 million (Table 1). Yearly variation in landings is substantial.⁴ Thirteen species are currently landed that are individually valued over \$1.0 million annually (Table 1). Shrimp landings average 31.2 million pounds at an annual average value of \$28.1 million. Spiny lobsters are second in importance with average value of landings equal to \$11.6 million. Value of spiny lobster landings have decreased to approximately one-half their previous levels because of a discontinuance of U.S. citizens fishing in Bahamian waters.

Red snapper and black mullet landings each averaged over \$3.4 million during 1972-1975. Grouper, king mackerel, and blue crab landings are between \$2.0 and \$2.7 million annually. The remaining species valued over \$1.0 million in 1975 were Spanish mackerel, stone crabs, calico scallops, pompano, spotted sea trout, and oysters. Calico scallops are the last species to enter the \$1.0 million and over annual category.

In addition to investments in 5,892 fishing craft, Florida fishermen also made substantial investments for gear and equipment used in the commercial fishery. The total number of gear units employed in the fishery exceeds 500,000 [12]. Gear units consist of pots, traps, trawls, nets, etc. These fixed investments along with the variable expenses associated with fishing contribute to the total economic impact of the commercial fisheries.

Industries interacting with the Florida commercial fishing sector include suppliers of gasoline, diesel, oil, ice, bait, fishing gear, rain coats, boots, gloves, groceries, boats, vessels, diesel and gasoline engines, electronic equipment, engine parts, paint, propellers, insurance, repair services on electronic equipment, boats, and engines, etc. In addition, industries providing docking facilities, bookkeeping services, financial services and credit, and government services such as boat registration interact with the commercial fishing sector.

ESTIMATED IMPACTS

Total Fishery

The largest expenditure in the fishing sector was \$14.3 million for repairs, maintenance, and depreciation (Table 2). This expenditure category

³For a complete description of Florida commercial fishermen see [12].

⁴For a complete analysis of trends in commercial marine landings see [3, 4, 8, 10, 11].

Table 1. Commercial marine landings, Florida, 1973-1975

Fishery	Year							
	1973		1974		1975		1972-75 average	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Total	164,462.6	62,495.6	174,202.6	68,093.1	162,655.8	73,731.7	167,107.0	68,106.8
-----1000 Pounds and Dollars-----								
Major Species:								
Groupers	5,536.7	1,702.1	6,700.2	2,352.6	7,913.0	3,178.2	5,983.3	2,711.0
King Mackerel	5,928.8	2,134.7	10,401.2	3,271.9	6,319.2	2,354.8	7,549.7	2,587.1
Black Mullet	29,279.2	3,216.0	27,883.1	3,434.4	25,748.5	3,687.5	27,636.9	3,446.0
Spanish Mackerel	9,397.2	1,536.6	10,612.0	1,902.8	10,765.9	1,862.6	10,258.4	1,767.3
Blue Crabs	13,511.9	1,678.9	17,604.5	2,197.5	16,992.0	2,221.5	16,036.4	2,032.6
Stone Crabs	2,087.8	1,425.5	2,590.6	1,899.6	2,160.7	1,801.2	2,279.7	1,708.8
Spiny Lobsters	11,171.7	11,661.1	10,874.1	13,382.2	7,408.4	9,863.0	9,818.1	11,635.4
Shrimp	29,197.6	26,247.9	32,453.9	24,737.3	32,076.4	33,401.4	31,242.6	28,137.9
Calico Scallops	1.6	2.1	1,074.4	587.8	1,992.2	1,249.5	1,022.7	613.3
Pompano	1,251.7	1,484.4	1,802.5	1,802.5	1,328.3	1,489.8	1,460.8	1,592.2
Spotted Sea Trout	2,892.1	1,104.5	2,919.0	1,150.7	2,704.3	1,155.9	2,838.5	1,136.9
Red Snapper	4,088.4	3,093.1	5,168.9	3,976.3	5,137.6	4,395.5	4,798.3	3,821.6
Oysters	2,531.3	1,593.0	2,751.4	1,609.2	2,213.1	1,259.6	2,498.0	1,487.3

Source: Computed from [6, 18].

included purchases of fishing craft, engines, electronic equipment, paint, propellers, and engine parts. The present value of capital investments per fishing firm (1.5 boats or vessels) averaged \$27,301.60 in 1974. This represents the total present value per firm for all gear including boats and/or vessels [12]. Assuming the average value of capital investments for the firms is the same as the \$27,301.60 from the 1974 sample, total value of investments in craft and gear in the Florida fishing sector is estimated to be approximately \$114 million in 1975. This does not include investments in wholesaling and processing facilities or in fishing gear replaced annually such as rain gear, boots, hooks, and other expendable items.

The second largest expenditure was for fuel and oil at \$13.3 million. A previous study showed that over 18 percent of Florida commercial fishermen owned two boats or vessels in 1974 [12]. Thirty-two percent of these craft were diesel and 68 percent were gasoline powered. The average diesel powered craft consumed 14,993 gallons of fuel while the average gasoline powered craft consumed only 1,417 gallons in 1974. This is probably because the larger and farther ranging craft were diesel powered rather than there being more fuel efficiency associated with gasoline powered craft. Using the 32 percent diesel and 68 percent gasoline craft proportion gives 4,007 gasoline and 1,885 diesel powered craft in Florida in 1974. Multiplying these estimates by the estimated average fuel usage of gasoline and diesel, respectively, yields projected fuel needs of 6.04 million gallons of gasoline and 30.1 million gallons of diesel annually by Florida commercial fishermen. Using a 1975 average price of \$.50 per gallon for gasoline and \$.35 per gallon for diesel, the data from [12] yield estimated total fuel expenditures of \$12.7 million for the Florida fishing sector. This estimate compares favorably with the \$13.3 million estimated expenditures for fuel and oil presented in Table 2.

Ice, bait, and interest on loans, the smallest expenditure categories, accounted for a total of 12.1 percent of total expenditures. Interest on loans was \$1.9 million in 1975. A recent study [12] indicates that approximately 69 percent of the fishermen had one or more loans outstanding in 1974. Local banks, the most important loan source, accounted for approximately 58.6 percent of all loans. A total of 23.5 percent borrowed from local fishhouses, 6.1 percent were indebted to the National Marine Fisheries Service, and 3.4 percent and 2.7 percent, respectively, obtained loans from the Production Credit Associations and the Small Business Administration. Also, approximately 5.7 percent obtained loans from "other" sources [12].

Every \$100 sales of fish by the Florida commercial fishing sector in 1975 generated sales in industries selling inputs to commercial fishermen of \$68.83 (Table 11). Each 100 pounds of fish landed resulted in these other industries selling \$31.20 to Florida commercial fishermen. Incomes generated, consisting of wages, salaries, crew shares, profits, etc., were \$31.17 per \$100 or \$14.13 per 100 pounds of fish sold. There was an estimated primary economic impact of \$168.83 for every \$100 of fish and \$76.53 for every 100 pounds of fish sold in Florida in 1975.

Florida landings of finfish and shellfish in 1975 were sold for \$73.7 million for industries supplying inputs to commercial fishermen (Table 2). This activity also generated \$23 million of incomes in the commercial fishing sector. The total primary economic impact was estimated to be over \$124 million for Florida's commercial fishing sector. This estimate of primary economic impact is 1.69 times sales at dockside.

Table 2. Expenditures, sales, income, and primary economic impact associated with Florida's commercial fish catching sector, 1975

Item	Dollars per 100 pounds fish landed	Dollars per \$100 fish landed	State total (dollars)
Expenditures:			
Fuel and oil	8.199	18.088	13,336,567.22
Ice	1.092	2.409	1,775,885.96
Bait	1.507	3.325	2,451,669.84
Fishing gear ^a	3.896	8.594	6,336,433.72
Supplies ^b	2.060	4.544	3,350,004.12
Repair, maintenance and depreciation ^c	8.775	19.357	14,272,599.36
Overhead ^d	4.491	9.906	7,304,126.35
Interest on loans	1.182	2.607	1,921,836.94
Total	31.202	68.830	50,749,123.51
Sales:			
Total fish and shell- fish	45.330	100.000	73,731,696.00
Income:^e	14.128	31.170	22,982,572.49
Primary economic impact:^f	76.532	168.830	124,480,819.51

^aConsists of purchases, repairs, maintenance, and depreciation for all types of fishing gear (nets, reels, traps, hooks, etc.).

^bConsists of rain coats, boots, gloves, groceries, etc.

^cConsists of purchases of boats, vessels, engines, electronic equipment, engine parts, paint, propellers, etc. Also consists of repairs and maintenance such as rebuilding and repairing engines, painting boat hulls, replacing damaged propellers, etc.

^dConsists of dockage fees, licenses, bookkeeping costs, payroll taxes, insurance, accounting fees, transportation costs, packing charges, spotter plane (when used), boat registration costs, etc.

^eIncome is sales of fish less expenditures, and includes wages, crew shares, salaries, and profits.

^fPrimary economic impact is computed as expenditures plus sales of fish.

Although there are more than 80 reported species of finfish and shellfish in the commercial fishing sector, the seven target species account for approximately 85 percent of the "impact" of the entire sector. The "impacts" of each of these seven species are presented in the following sections. The final section is a comparison of impacts by major (target) species.

Red Snapper-Grouper. Estimates of expenditures, sales, income, and primary economic impact for the Florida red snapper-grouper fishery were computed and projected to state totals from cost and returns budgets representative of Florida West Coast red snapper-grouper fishermen in 1974 and 1975 (Appendices A1-A3). The West Coast red snapper-grouper fisheries represented 88 percent of the 1975 state landings of red snapper and grouper.

Major expenditures in the red snapper-grouper fishery were for repairs and maintenance, groceries, bait, and fuel and oil (Table 3). Repairs and maintenance cost was \$1.3 million which was more than twice as large as any other major expenditure item and represented over 25 percent of total expenditures.

For each \$100 of fish sales in the red snapper-grouper fishery, other industries sold \$47.33 of items such as fuel and oil, ice, fishing craft, engines, fishing gear, etc. These sales of fish also generated \$52.67 of wages, crew shares, captains' salaries, profits, etc. Sales of \$100 by this fishery resulted in an estimated primary economic impact of \$147.33 in 1975.

Florida red snapper-grouper fishermen sold approximately \$8.5 million of fish, which then generated over \$4 million for industries supplying inputs to this fishery. This activity generated \$4.5 million of incomes. The primary economic impact was estimated at approximately \$12.5 million for the red snapper-grouper fishery in 1975.

Mullet. Cost and returns budgets based on data from mullet fishermen in Cedar Key, Florida, Bradenton, Florida, and "other" mullet fishermen located throughout the state⁵ in 1971 and 1974 were the basis of the impact table for this fishery (Appendices A4-A5). The data from these budgets were adjusted to be representative of the 1975 state landings of mullet.

Net replacement and depreciation, consisting of purchases of nets, lead weights, net repair materials, and other fishing gear was \$1.0 million and was the largest individual expenditure in 1975 by the mullet fishery (Table 4). Repair and maintenance, and fuel were the second and third largest expenditures, respectively. These three categories together accounted for 82.6 percent of the total expenditures by the mullet fishery.

Every \$100 sales by the Florida mullet fishery generated \$62.12 of sales in industries supplying inputs to this fishery which resulted in approximately \$2.4 million of sales statewide directly generated in these other industries. Mullet sales of \$100 produced \$37.88 of incomes which projects to a state

⁵Data for "other" mullet fishermen were taken from the survey reported in [12].

Table 3. Expenditures, sales, income, and primary economic impact associated with the Florida red snapper-grouper fishery, 1975

Item	Dollars per 100 pounds fish landed ^a	Dollars per \$100 fish landed ^b	State total ^c (dollars)
Expenditures:			
Fuel and oil	3.383	6.198	524,897.47
Groceries	3.993	7.316	619,543.49
Bait	3.873	7.096	600,924.60
Ice	1.749	3.204	271,370.29
Repairs and maintenance	8.220	15.060	1,275,393.80
Depreciation	3.244	5.943	503,330.60
License	.062	.114	9,619.76
Interest	.636	1.165	98,680.10
Insurance	.553	1.013	85,802.04
Docking fee	.119	.218	18,463.73
Total	25.832	47.327	4,008,025.88
Sales:			
Red snapper	85.556	100.000	4,395,500.00
Grouper	40.164	100.000	3,178,215.00
Other fish	36.306	100.000	894,990.00
Total^d	54.581	100.000	8,468,705.00
Income:^e	28.749	52.673	4,460,679.12
Primary economic impact:^f	80.413	147.327	12,476,730.88

^aBased on total landings of 85,360.90 pounds of fish (Appendix A3).

^bSee Appendices B2-B3.

^cBased on state landings.

^dTotal sales represents 100 pounds of a mixture of fish in proportion to the average catch. Therefore, total sales per 100 pounds of fish is not the sum of sales per 100 pounds of each species sold.

^eIncome is sales of fish less expenditures, and includes wages, crew shares, salaries, and profits.

^fPrimary economic impact is computed as expenditures plus sales of fish.

Derived from: Appendices A1-A3.

Table 4. Expenditures, sales, income, and primary economic impact associated with the Florida mullet fishery, 1975

Item	Dollars per 100 pounds fish landed ^a	Dollars per \$100 fish landed ^b	State total ^c (dollars)
Expenditures:			
Net replacement and depreciation	3.852	26.741	1,045,668.25
Ice	.497	3.450	134,916.18
Fuel	1.305	9.059	354,256.77
Repair and maintenance	2.235	15.515	606,715.61
Supplies	.714	4.957	193,823.24
Interest on loans	.168	1.166	44,674.89
Depreciation on boats	.132	.916	35,832.87
License	.020	.139	5,429.22
Accounting	.026	.180	7,057.99
Total	8.949	62.123	2,428,375.02
Sales:			
Mullet	14.370	100.000	3,821,287.00
Other fish ^b	16.086	100.000	89,102.84
Total^d	14.405	100.000	3,910,389.84
Income: ^e	5.456	37.877	1,482,014.82
Primary economic impact: ^f	23.354	162.123	6,338,764.86

^aBased on total landings of 49,000 pounds of fish (Appendix A5).

^bSee Appendices B2-B3.

^cBased on state landings.

^dTotal sales represents 100 pounds of a mixture of fish in proportion to the average catch. Therefore, total sales per 100 pounds of fish is not the sum of sales per 100 pounds of each species sold.

^eIncome is sales less expenditures, and includes wages, crew shares, salaries, and profits.

^fPrimary economic impact is computed as expenditures plus sales of fish.

Derived from: Appendices A4-A5.

total of \$1.5 million in wages, salaries, and profits. The estimated primary economic impact resulting from this \$100 of sales was \$162.12. The state total primary economic impact was projected to be \$6.3 million in 1975, as a result of the fishing activities of the Florida mullet fishery.

King Mackerel. Economic impact estimates for the Florida king mackerel fishery were based on budgets developed for Florida East Coast hook-and-line king mackerel fishermen in 1976 (Appendix A6). Florida East Coast landings of king mackerel represented 59 percent of total state landings of king mackerel in 1975.

Fuel expenditures of \$0.5 million were the largest single type of expenditure in the Florida king mackerel fishery (Table 5). Depreciation and repairs, and maintenance were second and third, respectively. These three expenditures together represented 72.5 percent of total expenditures.

A total of \$45.89 was spent in other industries for inputs and services for every \$100 sales in the king mackerel fishery. These mackerel sales generated \$54.11 of income. There was an estimated primary economic impact of \$145.89 resulting from each \$100 sales of Florida landed king mackerel in 1975.⁶

In 1975, Florida king mackerel fishermen sold \$3.6 million of fish which generated \$1.7 million of sales in industries selling inputs to this fishery. The fishery also generated almost \$2 million in incomes. The primary economic impact was estimated to be approximately \$5.3 million for Florida's king mackerel fishery in 1975.

Spanish Mackerel. Economic impact estimates for the Spanish mackerel fishery were made from budgetary data representative of Florida East Coast Spanish mackerel net fishermen in 1976 (Appendix A7). Florida East Coast landings of Spanish mackerel represented 48 percent of 1975 Florida landings of this species.

The largest expenditure in the Spanish mackerel fishery was for repairs, maintenance, and depreciation on nets (Table 6). This \$219,408 was primarily for purchases of monofilament line, lead weights, and other similar net repairing materials in 1975. This expenditure represented 22.7 percent of total expenditures in the Spanish mackerel fishery. Spotter plane expenses and fuel were the second and third largest expenditures, respectively. Spotter plane expenses consist of the boat captain sharing a percent of the value of the catch with an airplane pilot who spots schools of Spanish mackerel around which fishermen set their nets.

Fish sales of \$100 in this fishery generated \$38.96 of sales in other industries. This projects to a state total of nearly \$1.0 million. The same \$100 of sales generated wages, salaries, and profits (incomes) of \$61.04 which

⁶These budgets were for the 1976 production year. Total state projections were based on 1975 landings, giving a 1975 impact estimate. King mackerel net boat fisheries began around 1975 and have since become an important part of the fishery.

Table 5. Expenditures, sales, income, and primary economic impact associated with the Florida king mackerel hook and line fishery, 1975

Item	Dollars per 100 pounds fish landed ^a	Dollars per \$100 fish landed ^b	State total ^c (dollars)
Expenditures:			
Ice	1.008	2.488	89,999.31
Bait	.877	2.164	78,302.97
Fuel	5.203	12.841	464,550.02
Oil	.205	.506	18,303.43
Fishing gear:			
Paravanes	.098	.242	8,749.93
Wire	.281	.693	25,089.09
Hooks and spoons	.184	.454	16,428.45
Swivels and snaps	.059	.146	5,267.82
Other gear	.505	1.246	45,088.94
Raincoats and boots	.080	.197	7,142.80
Gloves	.391	.965	34,910.45
Repairs and maintenance:			
Hull and propeller	1.244	3.070	111,070.58
Engine (and oil change)	1.136	2.804	101,427.80
Electronic equipment	.553	1.365	49,374.62
Electric reels	.205	.506	18,303.43
Other gear	.016	.039	1,428.56
Depreciation:			
Engine	1.776	4.383	158,570.22
Hull	2.038	5.030	181,962.90
Electronic equipment	1.079	2.663	96,338.55
Electric reels	.233	.575	20,803.41
Boat registration	.056	.138	4,999.96
Insurance	.397	.980	35,466.16
Interest on loans	.364	.898	32,499.75
Bookkeeping costs	.087	.215	7,767.80
Dockage fee	.518	1.278	46,249.65
Total	18.593	45.886	1,660,076.60

Table 5. continued

Item	Dollars per 100 pounds fish landed ^a	Dollars per \$100 fish landed ^b	State total ^c (dollars)
Sales:			
King mackerel ^b	37.265	100.000	2,354,861.06
Spanish mackerel ^b	17.301	100.000	12,507.24
Bluefish ^b	13.882	100.000	7,253.31
Other fish ^b	50.034	100.000	1,243,210.57
Total ^d	40.520	100.000	3,617,832.18
Income: ^e	21.927	54.114	1,957,755.58
Primary economic impact: ^f	59.113	145.886	5,277,908.78

^aBased on total landings of 52,193.56 pounds of fish (Appendix A6).

^bSee Appendices B1 and B3.

^cBased on state landings.

^dTotal sales represents 100 pounds of a mixture of fish in proportion to the average catch. Therefore, total sales per 100 pounds of fish is not the sum of sales per 100 pounds of each species sold.

^eIncome is sales of fish less expenditures, and includes wages, crew shares, salaries, and profits.

^fPrimary economic impact is computed as expenditures plus sales of fish.

Derived from: Appendix A6.

Table 6. Expenditures, sales, income, and primary economic impact associated with the Florida Spanish mackerel net fishery, 1975

Item	Dollars per 100 pounds fish landed ^a	Dollars per \$100 fish landed ^b	State total (dollars)
Expenditures:			
Fuel	1.295	7.052	174,636.55
Oil	.044	.240	5,933.60
Spotter plane	1.569	8.544	211,586.67
Rain gear and gloves	.225	1.225	30,342.26
Ice	.371	2.020	50,031.01
Insurance	.165	.898	22,250.99
Interest on loans	.310	1.688	41,804.89
Overhead	.048	.261	6,473.01
Boat registration	.007	.038	943.68
Hull:			
Repair and maintenance	.174	.948	23,464.68
Depreciation	.332	1.808	44,771.69
Engine:			
Repair, maintenance, and depreciation	.872	4.748	117,593.10
Electronic equipment			
Repair and maintenance	.050	.272	6,742.72
Depreciation	.065	.345	8,765.54
Nets:			
Repair and maintenance	.336	1.830	45,311.10
Depreciation	1.291	7.030	174,097.13
Total	7.154	38.956	964,748.92
Sales:			
Spanish mackerel ^b	17.301	100.000	1,850,109.25
Bluefish ^b	13.882	100.000	195,014.09
Other fish ^b	31.099	100.000	431,341.34
Total ^d	18.364	100.000	2,467,464.68

Table 6. continued

Item	Dollars per 100 pounds fish landed ^a	Dollars per \$100 fish landed ^b	State total ^c (dollars)
Income: ^e	11.210	61.044	1,511,715.76
Primary economic impact: ^f	25.518	138.956	3,441,213.60

^aBased on total landings of 434,790.99 of fish (Appendix A7).

^bSee Appendices B1 and B3.

^cBased on state landings.

^dTotal sales represents 100 pounds of a mixture of fish in proportion to the average catch. Therefore, total sales per 100 pounds of fish is not the sum of sales per 100 pounds of each species sold.

^eIncome is sales of fish less expenditures, and includes wages, crew shares, salaries, and profits.

^fPrimary economic impact is computed as expenditures plus sales of fish.

Derived from: Appendix A7.

was projected to a state total of \$1.5 million. There was an estimated primary economic impact of \$138.96 per \$100 sales in this fishery. State total primary economic impact was estimated to be \$3.4 million for the Florida Spanish mackerel fishery in 1975.

Shrimp. Impact estimates for the Florida shrimp fishery were derived and projected to state totals from 1973 cost and returns budgets representative of Florida West Coast shrimp fishermen (Appendix A8). Florida West Coast landings of shrimp represented 91 percent of the 1975 Florida landings of shrimp.

Fuel, repairs and maintenance, and depreciation expenditures totaled \$16.4 million in 1975 and represented 60.3 percent of total expenditures in Florida's shrimp fishery (Table 7). The smallest expenditures were for nets, payroll taxes, and overhead (utilities, business services, etc.) which together accounted for only nine percent of total expenditures even though they amounted to almost \$3.0 million in 1975.

Florida shrimp fishermen spent \$85.86 in other industries for each \$100 of shrimp sales. This generated incomes of \$14.14. There was an estimated primary economic impact of \$185.86 for every \$100 sales of Florida Shrimp.

Commercial shrimpers in Florida sold shrimp valued at \$31.8 million in 1975. This, in turn, generated sales in other industries of \$27.3 million. Commercial fishing activities by the Florida shrimp fishery generated incomes of \$4.5 million in 1975. The primary economic impact of the shrimp fishery was estimated to be almost \$60 million in 1975.

Spiny Lobster. Estimates of expenditures, sales, income, and primary economic impact for the Florida spiny lobster fishery were computed from budgets based on 1973-1974 surveys of lobster fishermen located primarily in Monroe County (Appendices A9-A10). Data from these budgets were assumed to be representative of the total Florida landings. Approximately 70 percent of Florida landings of spiny lobsters are landed in Monroe County.

Depreciation was the greatest expenditure in the spiny lobster fishery, accounting for 43.7 percent of total expenditures (Table 8). Traps lost and fuel were the second and third largest expenditures, respectively, and together amounted to approximately \$1.5 million. These three items jointly accounted for 74.7 percent of total expenditures.

Each \$100 of spiny lobsters sold generated sales in other industries of \$47.65 which projected to a state total of \$4.7 million. Sales of \$100 by this fishery generated \$52.35 of incomes which was projected to \$5.2 million at the state level. There was an estimated primary economic impact of \$147.65 for every \$100 sales of spiny lobsters in 1975. The primary economic impact for the total Florida spiny lobster fishery was estimated to be approximately \$14.6 million in 1975.

Blue Crab. A 1972 cost and returns budget based on data from blue crab fishermen in Cedar Key, Florida enabled the computation and projection of state primary impacts for this fishery (Appendices A11-A12). Data from this

Table 7. Expenditures, sales, income, and primary economic impact associated with the Florida shrimp fishery, 1975

Item	Dollars per 100 pounds shrimp landed ^a	Dollars per \$100 shrimp landed ^b	State total ^c (dollars)
Expenditures:			
Ice	4.887	2.987	948,572.87
Fuel	46.502	28.418	9,026,096.91
Nets	3.136	1.916	608,701.56
Supplies and groceries	9.644	5.894	1,871,912.58
Repairs and maintenance	20.896	12.770	4,055,939.98
Payroll taxes	4.215	2.576	818,136.82
Packing	8.000	4.889	1,552,810.10
Insurance	13.744	8.400	2,667,727.75
Depreciation	17.302	10.574	3,358,340.04
Overhead	5.358	3.274	1,039,994.56
Interest	6.817	4.166	1,323,188.31
Total	140.501	85.864	27,271,421.48
Sales:			
Shrimp	163.633	100.000	31,761,329.00
Income:^d	23.132	14.136	4,489,907.52
Primary economic impact:^e	304.134	185.864	59,032,750.48

^aLandings of shrimp are shown on a heads-off basis. Heads off = (heads on)(.625). Also, based on 41,521.94 pounds of shrimp landed in the budget (Appendix A8).

^bSee Appendix B3.

^cBased on total state heads-off landings and sales of shrimp.

^dIncome is sales of shrimp less expenditures, and includes wages, crew shares, salaries, and profits.

^ePrimary economic impact is computed as expenditures plus sales of shrimp.

Derived from: Appendix A8.

Table 8. Expenditures, sales, income, and primary economic impact associated with the Florida spiny lobster fishery, 1975

Item	Dollars per 100 pounds spiny lobster landed ^a	Dollars per \$100 spiny lobster landed ^b	State total ^c (dollars)
Expenditures:			
Fuel	6.796	5.105	503,478.19
Oil and oil change	1.857	1.395	137,574.90
Groceries	1.453	1.091	107,644.76
Bait	2.655	1.994	196,694.32
Brushes	.136	.102	10,075.49
Gloves	.638	.513	50,599.71
Transportation	.188	.141	13,927.88
Puller operating cost	.129	.097	9,556.90
Rain gear	.364	.273	26,966.75
Traps lost	12.879	9.674	954,134.15
Repairs:			
Hull	2.123	1.595	157,281.37
Engine	3.461	2.600	256,406.42
Gear	.330	.248	24,447.88
Depreciation:			
Trap	14.390	10.809	1,066,075.81
Hull	6.135	4.608	454,508.35
Engine	5.028	3.777	372,496.82
Gear	2.152	1.616	159,429.82
License	.616	.463	45,636.05
Interest on loans	1.505	1.130	111,497.16
Insurance	.556	.418	41,190.98
Total	63.436	47.649	4,699,623.71
Sales:			
Spiny lobster	133.132	100.000	9,862,987.00

Table 8. continued

Item	Dollars per 100 pounds spiny lobster landed ^a	Dollars per \$100 spiny lobster landed ^b	State total ^c (dollars)
Income: ^d	69.696	52.351	5,163,363.29
Primary economic impact: ^e	196.568	147.649	14,562,610.71

^aBased on total landings in budget of 12,828 pounds of spiny lobster (Appendix A10).

^bSee Appendix B3.

^cBased on state landings and sales of spiny lobster.

^dIncome is sales of spiny lobster less expenditures, and includes wages, crew shares, salaries, and profits.

^ePrimary economic impact is computed as expenditures plus sales of fish.

Derived from: Appendices A9-A10.

budget were representative of the Florida West Coast blue crab fishery. West Coast landings of blue crabs in 1975 accounted for 75 percent of Florida blue crab landings.

Major expenditures in the blue crab fishery were for bait, trap replacement, and fuel (Table 9). These expenditures totaled \$1.7 million and represented 89.7 percent of total expenditures.

For every \$100 of blue crabs sold, other industries sold inputs valued at \$86.18 to this fishery. Also, these sales generated \$13.82 of incomes. There was an estimated primary economic impact of \$186.18 for each \$100 sales of the Florida blue crab fishery in 1975.

Florida blue crab fishermen sold \$2.2 million of crabs in 1975, which then generated sales of \$1.9 million in other industries. This activity created over \$300 thousand in wages, salaries, profits, etc. There was an estimated primary economic impact of \$4.1 million in 1975 as a result of commercial blue crab fishing in Florida.

Seven Major Fisheries. The previously discussed seven major fisheries accounted for approximately 85 percent of the expenditures, sales, income, and primary economic impact of the Florida commercial fishing sector in 1975. Table 10 presents a comparison per \$100 of fish sales among these seven fisheries. The shrimp fishery generated the greatest expenditures per \$100 of sales of shrimp in four of the categories: fuel and oil; repairs, maintenance, and depreciation; overhead; interest on loans. The mullet fishery led other fisheries in ice sales generated and fishing gear sales generated with \$3.45 and \$26.74 per \$100 of sales for ice and fishing gear, respectively. The greatest expenditures for bait were \$41.79 per \$100 of sales by the blue crab fishery. Red snapper-grouper fishermen spent the most for supplies at \$7.32 per \$100 of sales.

The blue crab fishery had the greatest total expenditures per \$100 sales while the Spanish mackerel fishery had the least. Incomes generated by the Spanish mackerel fishery at \$61.04 per \$100 fish sales, were the largest among these seven fisheries. The blue crab fishery had the greatest primary economic impact per \$100 of sales among these fisheries.

Total expenditures, income, sales and incomes generated may be compared for the seven fisheries by comparing the totals presented in Tables 3 through 9. This comparison considers both dollars generated per \$100 sales and total sales of fish products by the fishery. The shrimp fishery generated the greatest expenditures, sales, and primary economic impact. The spiny lobster fishery generated the most total income.

Other Florida Species. Estimates of expenditures, sales, income, and primary economic impact for the remaining species were computed from specific species impact tables and combinations of species impact tables (from the seven major fisheries) that "best" approximated expenditures for the species being analyzed. These were then aggregated into one impact table for other species.

Table 9. Expenditures, sales, income, and primary economic impact associated with the Florida blue crab fishery, 1975

Item	Dollars per 100 pounds blue crab landed ^a	Dollars per \$100 blue crab landed ^b	State total ^c (dollars)
Expenditures:			
Bait	5.467	41.790	929,065.10
Trap replacement	2.719	20.784	462,068.41
Fuel	1.929	14.745	327,815.36
Vessel repair	.602	4.602	102,304.22
Transportation	.230	1.758	39,086.33
Supplies	.154	1.177	26,170.85
Interest on investment	.100	.764	16,994.06
Depreciation	.050	.382	8,497.03
License	.010	.076	1,699.41
Accounting	.013	.099	2,209.23
Total	11.274	86.177	1,915,910.00
Sales:			
Blue crab	13.082	100.000	2,223,180.00
Income: ^d	1.808	13.823	307,270.00
Primary economic impact: ^e	24.356	186.177	4,139,090.00

^aBased on total landings in budget of 100,000 pounds of blue crab (Appendix A12).

^bSee Appendix B3.

^cBased on state landings and sales of blue crabs.

^dIncome is sales of blue crabs less expenditures, and includes wages, crew shares, salaries, and profits.

^ePrimary economic impact is computed as expenditures plus sales of fish.

Derived from: Appendices A11-A12.

Table 10. Expenditures, income, and primary economic impact per \$100 of fish sales in Florida's seven major fisheries, 1975

	Red snapper and grouper	Mullet	King mackerel	Spanish mackerel	Shrimp	Spiny lobster	Blue crab
Expenditures:							
Fuel and oil	6.198	9.059	13.347	7.292	28.418	6.500	14.745
Ice	3.204	3.450	2.488	2.020	2.987		
Bait	7.096		2.164			1.994	41.790
Fishing gear ^a	2.347 ^b	26.741	3.901	8.860	1.916	22.546	20.784
Supplies ^c	7.316	4.957	1.162	1.225	5.894	1.877	1.177
Repair, maintenance, and depreciation ^d	18.656	16.431	19.315	8.130	23.344	12.580	4.984
Overhead ^e	1.345	.319	2.611	9.741	19.139	1.022	1.933
Interest on loans	1.165	1.166	.898	1.688	4.166	1.130	.764
Total	47.327	62.123	45.886	38.956	85.864	47.649	86.177
Income:	52.673	37.877	54.114	61.044	14.136	52.351	13.823
Primary economic impact:	147.327	162.123	145.886	138.956	185.864	147.649	186.177

^aIncludes expenditures for fishing gear, as well as repairs, maintenance, and depreciation on fishing gear lasting longer than one year.

^bThe impact table for red snapper-grouper shows no fishing gear expenditures. However, for this comparison table estimates of fishing gear expenditures were derived from repairs, maintenance, and depreciation. These derivations were based on the relationships of fishing gear expenditures to repairs, maintenance, and depreciation in other hook and line fisheries similar to red snapper and grouper.

^cConsists of rain coats, boots, gloves, groceries, etc.

^dConsists of purchases of boats, vessels, engines, electronic equipment, etc. Also consists of repairs and maintenance such as rebuilding engines, painting boat hulls, replacing propellers, etc.

^eConsists of dockage fees, licenses, bookkeeping costs, payroll taxes, insurance, accounting fees, transportation costs, packing charges, spotter plane expenses, boat registration costs, etc.

Repairs, maintenance and depreciation, fuel and oil, and fishing gear were the three greatest expenditure categories for all "other" species of finfish and shellfish in Florida (Table 11). These expenditures accounted for approximately 72 percent of total expenditures. Interest on loans, ice, and supplies were the smallest expenditures. Supplies consisted of rain coats, boots, gloves, groceries, etc. These three smallest expenditure categories accounted for 11.7 percent of total expenditures which amounted to approximately \$914 thousand.

Each \$100 sales of "other" fish resulted in expenditures in other industries of \$68.36, incomes generated of \$31.64, and a primary economic impact of \$168.36. Commercial fishermen landing species in Florida other than those landed by the seven major fisheries sold approximately \$11.4 million of fish. This directly generated \$7.8 million of sales in other industries and \$3.6 million in income. There was an estimated primary economic impact of \$19.2 million in 1975 resulting from Florida landings of species in this category.

Output Effect

Primary economic impacts presented above have the advantage of identifying expenditures to specific industries for specified items. However, there were two disadvantages at this level of disaggregation. First, the impacts could not be restricted to state, region, or county. Second, the third, fourth, etc. round effects could not be estimated to determine "total" effects. Output multipliers, although based on highly aggregated estimates, do enable estimation of total impacts within specific geographical regions.

An output multiplier for the Florida fishing sector was obtained.⁷ This output multiplier was based on data derived from disaggregating the sector representing "forestry and fishing" in the Florida input-output model.

The estimated output multiplier expresses the magnitude of change in value of total output of all sectors (industries) in Florida associated with a change in output (sales) of fish in Florida. For example, this output multiplier of 1.40173 means that each dollar of sales of fish at dockside results in approximately \$1.40 of output (sales) in all of Florida.

Applying this multiplier to the fish catching sector with sales of \$74.7 million in 1975 gives an estimated output effect of \$103.4 million on the Florida economy. Thus relationships among factors of production remained unchanged from 1973 to 1975. Data for this output multiplier include interactions among the Florida fishing sector and other industries within Florida only (computed from Florida input-output model). Estimates of primary economic impact in this study included data about all industries that directly interact with the Florida commercial fishing sector, and were not constrained to Florida locations. However, the primary economic impact estimated for Florida's commercial fishing sector at \$124.5 million was close in magnitude to

⁷Obtained from Clemson University by Dr. David Mulkey, Assistant Professor of Food and Resource Economics, University of Florida.

Table 11. Expenditures, sales, income, and primary economic impact associated with all Florida species other than the main seven, 1975

Item	Dollars per 100 pounds fish landed	Dollars per \$100 fish landed	State total (dollars)
Expenditures:			
Fuel and oil	4.271	15.766	1,799,024.02
Ice	.667	2.463	280,996.30
Bait	1.535	5.667	646,682.85
Fishing gear ^a	3.411	12.593	1,436,950.96
Supplies ^b	.904	3.338	380,947.23
Repairs, maintenance, and depreciation ^c	5.660	20.894	2,384,226.48
Overhead ^d	1.471	5.430	619,616.28
Interest on loans	.599	2.213	252,497.78
Total	18.518	68.364	7,800,941.90
Sales:			
All species except those landed by the main seven fisheries	27.090	100.000	11,410,808.30
Income:^e	8.572	31.636	3,609,866.40
Primary economic impact:^f	45.608	168.364	19,211,750.20

^aConsists of purchases, repairs, maintenance, and depreciation for all types of fishing gear (nets, reels, traps, hooks, etc.).

^bConsists of rain coats, boots, gloves, groceries, etc.

^cConsists of purchases of boats, vessels, engines, electronic equipment, engine parts, paint, propellers, etc. Also consists of repairs and maintenance such as rebuilding and repairing engines, painting boat hulls, replacing damaged propellers, etc.

^dConsists of dockage fees, licenses, bookkeeping costs, payroll taxes, insurance, accounting fees, transportation costs, packing charges, spotter plane (when used), boat registration costs, etc.

^eIncome is sales of fish less expenditures, and includes wages, crew shares, salaries, and profits.

^fPrimary economic impact is computed as expenditures plus sales of fish.

the above estimate of output effect. At the national level the fish catching multiplier is 2.22 [20]. Using this estimate, Florida landed fish and shellfish in 1975 generated sales in the U.S. equal to \$163.7 million. This provides a measure of the importance of the Florida fishing sector to the U.S.

SUMMARY AND CONCLUSIONS

The Florida commercial fishing sector annually lands in excess of 160 million pounds of finfish and shellfish. These landings were valued at almost \$74 million at dockside in 1975. The two most valuable species are shrimp and spiny lobsters. Over 10,500 commercial fishermen using 5,892 boats and vessels participate in the fishing sector. Budgets developed for the seven major species landed in Florida were used to determine expenditures, income, and primary economic impact for the Florida commercial fishing sector. Although there are over 85 species of fish landed in Florida annually, these seven species and the associated incidental catches of other fish accounted for approximately 85 percent of total Florida landings in 1975. Cost and returns budgets for these species were adjusted to 1975 dollars using various wholesale and retail price indices. Estimates of expenditures, sales, income, and primary economic impact per 100 pounds, per \$100, and for the state total were computed for each of the seven fisheries. The 15 percent not accounted for by the seven major fisheries was estimated from individual species and combinations of species budgets from the major seven fisheries.

The largest expenditure by the commercial fishing sector was \$14.3 million for repairs, maintenance, and depreciation. These expenditures were incurred for boats and vessels, engines, electronic equipment, propellers, paint, engine parts, etc. In 1974, the present value of capital investments in these boats, vessels, and gear was estimated at approximately \$114 million. The second largest expenditure was for fuel. Fuel expenditures in 1975 by Florida commercial fishermen were projected to be \$12.7 million for 6.04 million gallons of gasoline and 30.1 million gallons of diesel.

Ice, bait, and interest on loans were the smallest expenditures by Florida commercial fishermen in 1975. Approximately 69 percent of the commercial fishermen in 1974 were estimated to have one or more loans outstanding. The most important loan source was local banks which accounted for 58.6 percent of all loans.

The Florida commercial fishing sector sold \$73.7 million of finfish and shellfish in 1975. These sales generated \$50.7 million for industries supplying inputs to commercial fishermen. Fishing activities also generated \$23 million of incomes in the form of wages, profits, and salaries to captains, boat owners, and crew. The primary economic impact of the Florida commercial fishing sector was estimated to be \$124.5 million in 1975.

Comparing the seven major fisheries, the blue crab fishery had the greatest expenditures per \$100 sales. The blue crab fishery had the smallest incomes generated per \$100 sales but the greatest primary economic impact per \$100 sales. The Spanish mackerel fishery generated the most income per \$100 sales. The shrimp fishery had the greatest total expenditures, sales, and primary economic impact of these seven fisheries.

The estimated primary economic impact for the commercial fishing sector of \$124.5 million was not limited to industry transactions in Florida, and was approximately 20 percent greater than the output effect which was estimated to be \$103.4 million using the fish harvesting output multiplier for Florida. Using the 1967 national fish harvesting output multiplier of 2.22 [20], Florida landings of finfish and shellfish in 1975 generated sales (output effect) in the U.S. equal to \$163.7 million. This estimate is a measure of the relative importance of the Florida fish catching sector to the United States.

Table A1. Estimated expenditures for the Florida red snapper-grouper fishery, 1974 and 1975

Expense item	Index type ^a	1974 index	1975 index	1974 costs		1975 costs	
				Four 42-47 foot vessels	Six 57-59 foot vessels	Four 42-47 foot vessels	Six 57-69 foot vessels
----- dollars -----							
Fuel and oil	Petroleum products, refined (W)	223.4	257.5	2,207.00	4,053.00	2,543.88	4,671.65
Groceries	Food (R)	161.7	175.4	2,721.00	5,211.00	2,951.54	5,652.50
Bait	All commodities (W)	160.1	174.9	1,978.00	5,955.00	2,160.85	6,505.49
Ice	All commodities-less farm products (W)	156.8	173.4	1,171.00	2,317.00	1,294.97	2,562.29
Repairs and maintenance	All commodities-less farm products (W)	156.8	173.4	4,084.00	8,762.00	4,516.36	9,689.61
Crew shares ^b	22.833 percent of gross (4 boats)			9,443.00	20,865.00	10,361.11	22,351.02
	21.503 percent of gross (6 boats)						
Depreciation				2,770.00	3,842.00	2,770.00	3,842.00
License				52.00	55.00	52.00	55.00
Interest				793.00	0.00	793.00	0.00
Insurance	All commodities-less farm products (W)	156.8	173.4	326.00	0.00	360.51	0.00
Total costs				25,545.00	51,060.00	27,804.22	55,329.56

^aW denotes wholesale price index and R denotes retail price index.

^bCrew shares were determined as follows: Crew shares in the original budgets were divided by the total value of landings in the original budgets. Crew shares for 1975 were then estimated as the same proportion of value of landings as estimated in 1974.

Derived from: 1. Cato, James C. and Fred J. Prochaska. "A Statistical and Budgetary Economic Analysis of Florida Based Gulf of Mexico Red Snapper-Grouper Vessels by Size and Location, 1974 and 1975." Marine Fisheries Review, Paper 1269, Nov. 1977.

2. U.S. Department of Labor, Bureau of Labor Statistics. Monthly Labor Review, 1975-1976.

Note: Cost and returns estimates for two of the four categories were available in 1975 dollars. Therefore, only two of the categories had to be converted from 1974 to 1975 dollars.

Table A2.--Annual cost and returns for Florida Gulf of Mexico red snapper-grouper vessels by length class and production area, 1975

Item	36 feet to 47 feet (small)		56 feet to 69 feet (large)					
	(four craft)		(six craft)					
	Northern Gulf	Southeastern Gulf	Northern Gulf	Southeastern Gulf				
	Pounds	Dollars ^a	Pounds	Dollars ^a	Pounds	Dollars ^a	Pounds	Dollars ^a
Returns:								
Red snapper	32,654	38,614.70	13,195	11,243.00	92,955	89,875.39	15,599	13,067.00
Grouper	28,325	14,884.22	43,334	17,281.00	4,409	2,290.50	51,518	20,203.00
Other	3,991	1,878.87	6,196	1,860.00	32,424	11,774.45	5,888	2,289.00
Total	64,970	55,377.80	62,725	30,384.00	129,828	103,940.34	73,005	35,548.00
Variable costs:								
Fuel and oil		2,543.88		1,759.00		4,671.65		2,248.00
Groceries		2,951.54		2,166.00		5,652.50		2,364.00
Bait		2,160.85		1,804.00		6,505.49		1,907.00
Ice		1,294.97		836.00		2,562.29		1,072.00
Repairs and maintenance		4,516.36		6,349.00		9,689.61		6,511.00
Crew shares		10,361.11		4,299.00		22,351.02		8,068.00
Total		23,828.71		17,213.00		51,432.56		22,170.00
Fixed costs:								
Depreciation		2,770.00		1,875.00		3,842.00		2,500.00
License		52.00		52.00		55.00		52.00
Interest		793.00		200.00		0.00		1,620.00
Insurance		360.51		533.00		0.00		1,200.00
Docking fee		0.00		230.00		0.00		165.00
Total		3,975.51		2,890.00		3,897.00		5,537.00
Total costs		27,804.22		20,103.00		55,329.56		27,707.00
Total net return to captain and owner ^b		17,573.58		10,281.00		48,610.78		7,841.00

^aThe price of each species in the budget was estimated as the average 1975 West Coast price adjusted for the percentage difference in average West Coast price and average budget price. The price for "other fish" was estimated as the price of other fish reported in the budget with percentage adjustments for the difference in the budget price of other fish and the 1975 average West Coast price of all fish except red snapper and grouper.

^bTotal net returns to captain and owner represent captains' salaries and returns to owners labor, management, and investment. It is computed as total returns less total costs.

Derived from: Cato, James C. and Fred J. Prochaska. "A Statistical and Budgetary Economic Analysis of Florida Based Gulf of Mexico Red Snapper-Grouper Vessels by Size and Location, 1974 and 1975." Marine Fisheries Review, Paper 1269, Nov. 1977.

Table A3. Estimated average annual costs and returns for Florida Gulf of Mexico red snapper-grouper vessels, 1975.

Item	Pounds	Dollars
Returns:^a		
Red snapper	41,507.60	38,671.86
Grouper	30,291.50	12,888.89
Other	13,561.80	4,923.71
Total	85,360.90	56,484.46
Costs:^a		
Variable costs:		
Fuel and oil		2,887.57
Groceries		3,408.66
Bait		3,306.42
Ice		1,492.88
Repairs and maintenance		7,017.01
Crew shares		11,680.83
Total variable costs		29,793.37
Fixed costs:		
Depreciation		2,769.10
License		52.90
Interest		542.60
Insurance		472.00
Docking fee		102.00
Total fixed costs		3,938.60
Total costs		33,731.97
Total net return to captain and owner		22,752.49

^aThis budget is a weighted average of budgets presented in Table A2. Weights were the number of vessels in each category.

Derived from: Cato, James C. and Fred J. Prochaska. "A Statistical and Budgetary Economic Analysis of Florida Based Gulf of Mexico Red Snapper-Grouper Vessels by Size and Location, 1974 and 1975." Marine Fisheries Review, Paper 1269, November 1977.

Table A4.--Estimated expenditures for the Florida mullet fishery, 1971 and 1975

Expense item	Index type ^a	1971 index	1975 index	1971 costs	1975 costs
Net replacement and depreciation ^b				1,887.48	1,887.48
Ice	All commodities-less farm products (W)	114.0	173.4	160.00	243.37
Fuel (gasoline) ^c	All commodities-less farm products (W)	114.0	173.4	280.30	639.45
Repair and maintenance	All commodities-less farm products (W)	114.0	173.4	720.00	1,095.16
Supplies	All commodities-less farm products (W)	114.0	173.4	230.00	349.84
Interest on loans ^d				82.41	82.41
Opportunity cost on investment ^e				486.16	486.16
Depreciation on boats ^f				64.47	64.47
License				10.00	10.00
Accounting	Services (R)	128.4	166.6	10.00	12.98
Total costs				3,930.82	4,871.32

^aW denotes wholesale price index and R denotes retail price index.

^bNet replacement and depreciation was estimated based on the relationship of net investment to total investment in boat and nets from source 1 below as follows: Total investment in nets and boats was divided into investment in nets. This was then multiplied by an estimated investment in boats and nets of \$5,685.71 (from seven Florida mullet fishermen from survey data). The resulting product was then divided by 2.5 years, which was the estimated remaining life of the nets.

Table A4.--continued

^cFuel cost for 1975 was estimated by obtaining the average gallons of fuel usage per pound of fish caught for seven Florida mullet fishermen from survey data and multiplying this by 49,000 pounds of catch. This was then multiplied by an average 1975 price of \$.50 per gallon of gasoline. Fuel cost for 1971 was estimated by deflating the 1975 fuel cost by the wholesale price index for gasoline.

^dInterest on loans was estimated to be 1.4495 percent by dividing 10 percent of total investment into the average interest on loans, estimated from other similar finfish budgets. This 1.4495 percent was then multiplied by the total value of investment, which gave an estimated interest on loans of \$82.41.

^eOpportunity cost on investment represents 10 percent of the total value of investment minus \$82.41 charged to interest on loans.

^fDepreciation on boats was estimated based on the relationship of investment in boats to total investment in boats and nets from source 1 below as follows: Total investment in boats and nets was divided into investment in boats. This was then multiplied by an estimated investment in boats and nets of \$5,685.71 (from seven Florida mullet fishermen from survey data). The resulting product was then divided by 15 years, which was the estimated remaining life of the boats.

Derived from: 1. Anderson, C. L. and R. H. McNutt. Costs and Returns in Commercial Fishing. Mullet Fishing-Florida, A Case Study. State University System of Florida Cooperative Extension Service Marine Advisory Program, SUSF-SG-73-002. Lake Alfred: 1971.

2. Smith, Frederick J. and Fred J. Prochaska. Marine Economics Data: 26-Foot Cedar Key (Florida) Mullet Vessel. U.R.I. Marine Advisory Service, Sea Grant Program. Marine Memorandum No. 12. Narragansett: February, 1972.

3. U.S. Department of Labor, Bureau of Labor Statistics. Monthly Labor Review, 1972-1975.

Table A5-- Average costs and returns for 26-foot Cedar Key (Florida) mullet vessels, 1971 and 1975

Item	1971	1975
Returns: ^a		
Mullet		
Pounds	48,000	48,000
Dollars ^a	3,840.00	7,042.56
Other fish		
Pounds	1,000	1,000
Dollars ^a	120.00	160.86
Total		
Pounds	49,000	49,000
Dollars ^a	3,960.00	7,203.42
Costs:		
	- - - - dollars - - - -	
Variable costs:		
Net replacement and depreciation	1,887.48	1,887.48
Ice	160.00	243.37
Fuel (gasoline)	280.30	639.45
Repair and maintenance	720.00	1,095.16
Supplies	230.00	349.84
Total variable costs	<u>3,277.78</u>	<u>4,215.30</u>
Fixed costs:		
Interest on loans ^b	82.41	82.41
Opportunity cost on investment	486.16	486.16
Depreciation on boats	64.47	64.47
License	10.00	10.00
Accounting	10.00	12.98
Total fixed costs	<u>653.04</u>	<u>656.02</u>
Total costs	3,930.82	4,871.32
Total returns less variable costs	682.22	2,988.12
Return to operator labor and management (total returns less total costs)	29.18	2,332.10

Table A5.--continued

Item	1971	1975
	- - - - dollars - - -	
Return to investment (total returns less all costs except interest on investment and less management charge) ^b	-4,202.25	-3,478.23

^aReturns were estimated as the product of quantity of mullet and average 1975 Florida West Coast mullet price plus the product of quantity of other fish and the estimated average 1975 price of other fish. West Coast average price of mullet was used for 1975 budget price because West Coast average price for 1971 differed from the 1971 budget price by less than \$.01. The 1975 average price of other fish was estimated by adjusting the 1971 budget price of other fish by the percentage increase in West Coast price, between 1971 and 1975, of the species of other fish caught by seven Florida mullet fishermen (from survey data).

^bManagement charge is the value of operators' management in alternative employment. It was estimated from surveys of mullet fishermen to be \$4,800 in 1971, and adjusted by the consumer price index for "all items," to be \$6,378.90 in 1975.

- Derived from:
1. Anderson, C.L. and R.H. McNutt. Costs and Returns in Commercial Fishing. Mullet Fishing-Florida, A Case Study. State University System of Florida Cooperative Extension Service Marine Advisory Program, SUSF-SG-73-002. Lake Alfred: 1971.
 2. Smith, Frederick J. and Fred J. Prochaska. Marine Economics Data: 20-Foot Cedar Key (Florida) Mullet Vessel. U.R.I. Marine Advisory Service, Sea Grant Program. Marine Memorandum No. 12. Narragansett: February, 1972.

Table A6.--Average costs and returns for Florida king mackerel hook and line boats, 1976

Item	Average ^a
Returns:	
King mackerel	
Pounds	36,940.53
Dollars	17,894.73
Spanish mackerel	
Pounds	422.71
Dollars	76.03
Bluefish	
Pounds	316.82
Dollars	38.02
Other fish	
Pounds	14,513.49
Dollars	7,261.68
Total	
Pounds	52,193.56
Dollars	25,270.46
Costs:	- dollars -
Variable costs:	
Ice	526.23
Bait	457.69
Fuel	2,715.52
Oil	106.94
Paravanes	51.24
Wire	146.88
Hooks and spoons	96.10
Swivels and snaps	30.61
Other gear	263.44
Raincoats and boots	41.70
Gloves	204.15
Repairs and maintenance:	
Hull and propeller	649.20
Engine (and oil change)	592.73
Electronic equipment	288.63
Electronic reels	106.97
Other gear ^b	8.41
Total variable costs	6,286.44

Table A6.--continued

Item	Average ^a
	- -dollars- -
Fixed costs:	
Depreciation	
Engine	927.16
Hull	1,063.87
Electronic equipment	563.33
Electric reels	121.62
Boat registration	29.41
Insurance	207.32
Interest on loans	190.12
Bookkeeping costs	45.25
Dockage fee	270.15
Total fixed costs	3,418.23
Total costs	9,704.67
Net returns	15,565.79

^aEstimated from surveys taken from 10 Florida East Coast hook and line boat operators during February, 1977.

^bRepair and maintenance on other gear represents the repair and maintenance on nets by one fisherman in the sample who used nets.

Table A7.--Average costs and returns for Florida Spanish mackerel net boats, 1975

Item	Average ^a
Returns:	
Spanish mackerel	
Pounds	344,779.54
Dollars	61,679.14
Bluefish	
Pounds	46,998.27
Dollars	6,066.23
Other	
Pounds	43,013.19
Dollars	13,376.47
Total	
Pounds	434,790.99
Dollars	81,121.83
Costs:	
	- dollars -
Variable costs:	
Fuel	5,629.15
Oil	190.06
Crew share ^b	26,866.80
Other labor	2,614.42
Spotter plane	6,820.20
Rain gear and gloves	976.21
Ice	1,613.14
Total variable costs	44,709.98
Fixed costs:	
Insurance	716.75
Interest	1,347.57
Overhead	208.21
Boat registration	30.40
Hull:	
Repair and maintenance	758.03
Depreciation	1,441.39
Engine:	
Repair, maintenance, and depreciation	3,791.47

Table A7.--continued

Item	Average ^a
	- - dollars - -
Electronic equipment:	
Repair and maintenance	219.27
Depreciation	283.70
Nets:	
Repair and maintenance	1,461.35
Depreciation	5,612.65
Total fixed costs	15,870.79
Total costs	60,580.77
Net return	20,541.06

^aEstimated from surveys taken from 13 Florida East Coast net boat operators during February, 1977.

^bCrew share includes groceries provided for the crew.

Table A8.--Estimated average annual costs and returns for Florida Gulf of Mexico shrimp vessels, 1973 and 1975

Item	Index type ^a	1973 index	1975 index	1973 average ^b	1975 average
Returns:					
Pounds				41,521.94	41,521.94
Price per pound ^c (dollars)				1.66 ^d	1.72 ^d
Dollars				69,295.97	71,430.19
Costs:					
----- dollars -----					
Variable costs:					
Ice	All commodities-less farm products (W)	129.90	173.40	1,520.26	2,029.35
Fuel	Diesel fuel (W)	139.70	309.40	8,718.20	19,308.60
Nets ^e	Average of cotton products and man-made fiber products (W)	132.70	148.80	1,161.06	1,301.93
Supplies and groceries	All commodities (W)	134.70	174.90	3,084.14	4,004.57
Repairs and maintenance	All commodities-less farm products (W)	129.90	173.40	6,499.74	8,676.33
Crew shares ^f	35 percent of total value of landings			24,253.59	25,000.57
Payroll taxes ^g	Seven percent of crew shares			1,697.75	1,750.04
Packing ^h				2,158.43	3,321.76
Total variable costs				49,093.17	65,393.15
			\$8.00 per 100 pounds heads-off		

Table A8.--continued

Item	Index type ^a	1973 index	1975 index	1973 average ^b	1975 average
Fixed costs: - - - - dollars - - - -					
Insurance	All commodities-less farm products (W)	129.90	173.40	4,275.00	5,706.58
Depreciation ⁱ	Index for lumber, metal, and diesel engines (W)	144.20	176.83	6,917.89	7,184.01
Overhead ^j	All commodities-less farm products (W)	129.90	173.40	1,666.51	2,224.58
Interest (9 per-cent) ^k	Index for lumber, metal and diesel engines (W)	144.20	176.83	2,725.80	2,830.65
Total fixed costs				15,585.20	17,945.82
Total costs				64,678.37	83,338.97
Total profit ^l				4,617.60	-11,908.78

^aW denotes wholesale price index and R denotes retail price index.

^bA weighted average was used where weights were the number of vessels in each category.

^cWeighted average 1973 (heads-off) "budget" shrimp price was estimated by dividing weighted average pounds into weighted average dollars. The percentage difference in weighted average 1973 budget shrimp price and 1973 average Florida West Coast price was then determined. The 1975 budget shrimp price was estimated as the sum of 1975 average West Coast price and the percentage adjustment based on the difference in the 1973 average West Coast price and 1973 weighted average budget price.

^dActual numbers used in calculation were \$1.6689 and \$1.7203 for 1973 and 1975, respectively.

Table A8.--continued

^eNets were included with groceries and supplies in the budget from which Table A8 was taken (source 1 below). However, cost and returns data from other budgets separated these items. The ratio of nets to total nets, groceries, and supplies was estimated to be 27.35 percent. Consequently, 27.35 percent of the weighted average estimate for nets, supplies, and groceries was used as the estimate for nets, and the remainder was used for groceries and supplies.

^fBased on a share agreement of 35 percent of total dollar returns.

^gBased on payroll taxes of seven percent of crew shares.

^hPacking was \$8.00 per 100 pounds in 1975.

ⁱBetween 1973 and 1975 shrimp fishermen replaced 17 percent of their equipment [6]. The 17 percent they replaced was inflated with a wholesale price index based on a simple average of the price indices for lumber, metal, and diesel engines.

^jIncludes office, professional, and license expenses.

^kInterest on investment is based on 17 percent of the equipment being replaced over the time period and is computed in the same manner as depreciation in footnote i above.

^lTotal profit is calculated as total returns less total costs.

- Derived from: 1. Griffin, Wade L. and N.J. Wardlaw. Economic Analysis of Costs and Returns of Gulf of Mexico Shrimp Vessels. Texas A & M University, Department of Agricultural Economics. College Station: 1973.
2. U.S. Department of Labor, Bureau of Labor Statistics. Monthly Labor Review, 1974-1976.
3. U.S. Department of Labor, Bureau of Labor Statistics. Wholesale Prices and Price Indexes, 1974-1976.

Table A9.--Estimated expenditures for the Florida spiny lobster fishery, 1973-1974 average and 1975

Expense item	Index type ^a	Index		Cost	
		1973-1974	1975	1973-1974	1975
- - - dollars - - -					
Fuel					
Oil and oil change					
Petroleum products, refined (W)		176.05	257.50	596.00	871.74
Motor oil (W)		133.75	153.90	207.00	238.19
Groceries					
All food (R)		151.55	175.40	161.00	186.34
Bait					
All commodities (W)		147.40	174.90	287.00	340.54
Brushes					
Industrial brushes (W)		130.80	152.00	15.00	17.43
Gloves					
Gloves (W)		169.15	190.10	78.00	87.66
Transportation					
Transportation services (R)		139.40	152.70	22.00	24.10
Puller operation costs					
All commodities (W)		147.40	174.90	14.00	16.61
Rain gear					
Water repellent topcoats (W)		131.10	136.20	45.00	46.75
Traps lost					
Average of wood and concrete (W)		161.65	174.10	1,534.00	1,652.15
Crew wages ^b					
Repairs:					
Hull					
Labor wage rate index		140.40	161.20	1,528.00	1,746.29
Average of wood, metal, and C.P.I. for all items (W) and (R)		157.72	174.57	246.00	272.28
Engine					
Average of gas and diesel engines and C.P.I. for all items (W) and (R)		137.59	169.70	360.00	444.01
Gear					
All commodities-less farm products (W)		143.35	173.40	35.00	42.34
Total repairs				641.00	758.63

Table A9.--continued

Expense item	Index type ^a	Index			Cost
		1973-1974	1975	1973-1974	
Depreciation:	Trap				
	Hull			1,846.00	1,846.00
	Engine			787.00	787.00
	Gear			645.00	645.00
				276.00	276.00
Total depreciation				3,554.00	3,554.00
License				79.00	79.00
Interest on loans				193.00	193.00
Insurance	All commodities-less farm products (W)	143.35	173.40	59.00	71.37
Total costs				9,013.00	9,883.80

^aW denotes wholesale price index and R denotes retail price index. C.P.I. denotes consumer price index.
^bCrew were paid \$7.00 per hour in the 1973-1974 budget. The total annual dollars paid to the crew divided by seven equals the hours worked. Adjusting this \$7.00 per hour by the labor wage rate increase for food and kindred products (taken from Monthly Labor Review from source 2 below between 1973-1974 and 1975 yields \$8.00 per hour for 1975. This \$8.00 per hour multiplied by the estimated 218,2857 hours worked gives crew wages for 1975 of \$1,746.29.

- Derived from:
1. Prochaska, F. J. and J.S. Williams. Economic Analysis of Cost and Returns in the Spiny Lobster Fishery By Boat and Vessel Size. Florida Cooperative Extension Service Marine Advisory Bulletin. SUSF-SG-76-004. Gainesville: 1976.
 2. U.S. Department of Labor, Bureau of Labor Statistics. Monthly Labor Review, 1974-1976.
 3. U.S. Department of Labor, Bureau of Labor Statistics. Wholesale Prices and Price Indexes, 1974-1976.

Table A10.--Costs and returns analysis for Florida keys lobster boats and vessels, 1973-1974 average and 1975

Item	1973-1974 ^a	1975
Returns:		
Lobster:		
Pounds	12,828	12,828
Dollars ^b	13,848.00	17,078.12
Crabs (dollars) ^b	3,378.00	
Other (dollars) ^b	4,731.00	
Total (dollars) ^b	21,957.00	
Costs (lobster fishing):		
- - - - dollars - - - - -		
Variable costs:		
Fuel	596.00	871.74
Oil and oil change	207.00	238.19
Groceries	161.00	186.34
Bait	287.00	340.54
Brush	15.00	17.43
Gloves	78.00	87.66
Transportation	22.00	24.10
Puller operating cost	14.00	16.61
Rain gear	45.00	46.75
Traps lost	1,534.00	1,652.15
Crew wages	1,528.00	1,746.29
Repairs: ^d	246.00	272.28
Hull	360.00	444.01
Engine	35.-0	42.34
Gear		
Total repairs	<u>641.00</u>	<u>758.63</u>
Total variable costs	5,128.00	5,986.43
Fixed costs:		
Depreciation: ^c		
Traps	1,846.00	1,846.00
Hull	787.00	787.00
Engine	645.00	645.00
Gear	276.00	276.00
Total depreciation	3,554.00	3,554.00

Table A10.--continued

Item	1973-1974 ^a	1975
	- - - - dollars - - - -	
License	79.00	79.00
Interest on loans	193.00	193.00
Insurance	59.00	71.37
Total fixed costs	3,885.00	3,897.37
Total costs	9,013.00	9,883.80
Net return to lobster fishing: ^d		
Above total variable costs	8,720.00	11,091.69
Above total costs	4,835.00	7,194.32

^aA stratified sample of 25 fishing craft was included in this analysis. This represents a weighted average of these craft for 1973-1974.

^bReturns were estimated by calculating the state average 1975 dockside price of spiny lobsters and multiplying this by the pounds caught in each budget. Different portions of total landings of lobsters were estimated for 1973 than for 1974, so an average of 1973-1974 state prices was not used for comparison with the prices received in the 1973-1974 budgets. These budgets were based on samples from Monroe County, but Monroe County average prices were not available for 1975 at the time of this study. Therefore, state average prices were used for the 1975 estimates. State average price differed from Monroe County average price from 1971 to 1974 by less than \$.02, so state average price for 1975 was assumed to be a good approximation of Monroe County average prices for 1975. Dollars were estimated by multiplying pounds (quantity) by the 1975 state average dockside price for lobsters.

^cRepair and depreciation on hull, engine, and gear (other than traps) were prorated according to percent of income earned from lobster fishing. Interest and insurance were prorated in the same manner.

^dNet returns include cost and returns for lobster fishing only.

Derived from: Prochaska, F. J. and J. S. Williams. Economic Analysis of Cost and Returns in the Spiny Lobster Fishery By Boat and Vessel Size. Florida Cooperative Extension Service Marine Advisory Bulletin. SUSF-SG-76-004. Gainesville: 1976.

Table All.--Estimated expenditures for the Florida blue crab fishery, 1971 and 1975

Expense item	Index type ^a	1975 index		Costs	
		1971	1975	1971	1975
Bait	All commodities (W)	113.90	174.90	3,560.00	5,466.58
Trap replacement	Steel wire (W)	119.60	216.80	1,500.00	2,719.06
Fuel	Petroleum products, refined (W)	106.08	257.50	800.00	1,928.84
Vessel repair	Lumber, metal, gas engines and C.P.I. for all items, averaged (W) and (R)	122.70	175.88	420.00	602.03
Transportation	Transportation services (R)	133.00	152.70	200.00	229.62
Supplies	All commodities (W)	113.90	174.90	100.00	153.56
Interest on investment (10 percent)				100.00	100.00
Depreciation				50.00	50.00
License				10.00	10.00
Accounting	Services (R)	128.40	166.60	10.00	12.98
Total costs				6,750.00	11,272.67

^aW denotes wholesale price index and R denotes retail price index. C.P.I. denotes consumer price index.

- Derived from: 1. Smith, Frederick J. and Fred J. Prochaska. Marine Economics Data: 26-Foot Cedar Key (Florida) Crab Vessel. U.R.I. Marine Advisory Service, Sea Grant Program. Marine Memorandum No. 13. Narragansett: February, 1972.
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Table A12.--Costs and returns for 26-foot Cedar Key (Florida) crab vessels, 1971 and 1975

Item	1971	1975
Returns:		
Pounds	100,000	100,000
Price per pound ^a (dollars)	.08	.12 ^b
Dollars	8,000.00	12,385.00
- - - dollars - - -		
Costs:		
Variable costs:		
Bait	3,560.00	5,466.58
Trap replacement	1,500.00	2,719.06
Fuel	800.00	1,928.84
Vessel repair ^c	420.00	602.03
Transportation	200.00	229.62
Supplies	100.00	153.56
Total variable costs	<u>6,580.00</u>	<u>11,099.69</u>
Fixed costs:		
Interest on investment (10 percent) ^d	100.00	100.00
Depreciation	50.00	50.00
License	10.00	10.00
Accounting	10.00	12.98
Total fixed costs	<u>170.00</u>	<u>172.98</u>
Total costs	6,750.00	11,272.67
Returns above total variable costs	1,420.00	1,285.31
Returns to operator labor and management (returns less total costs)	1,250.00	1,112.33
Returns to investment (gross returns less all costs except interest on investment and less management charge ^e)	-4,650.00	-6,761.29

^aAverage 1975 West Coast dockside price of blue crab was used because the 1971 budget price differed from 1971 West Coast average price by less than \$.01. Consequently, the average 1975 West Coast price was the best available approximation for 1975 budget price.

^bActual number used in calculation was \$.12385.

^cIncludes operator's labor at \$30 per day.

^dInterest is uniformly charged against all investment, whether or not borrowed.

^eManagement charge is the value of operator's management in alternative employment. It was estimated by cooperating fishermen to be \$6,000 in 1971 and adjusted by the consumer price index for "all items" to be \$7,973.62 in 1975.

Derived from: Smith, Frederick J. and Fred J. Prochaska. Marine Economics Data: 26-Foot Cedar Key (Florida) Crab Vessel. U.R.I. Marine Advisory Service. Sea Grant Program, Marine Memorandum No. 13. Narragansett: February, 1972.

APPENDIX B
ESTIMATION PROCEDURES FOR PRIMARY ECONOMIC
IMPACT TABLES

APPENDIX B1

Estimation Procedures for Quantity and Average Price of
All Fish Landed by the Florida Spanish Mackerel
and King Mackerel Fisheries

Given: Budgets A and B. There is a main species and an incidental catch landed by both budgets. The composition of the incidental catch of these budgets is such that there is at least one species that is landed by both budgets. The projected state total catch of this common species accounted for by these two budgets together is greater than recorded state landings of this species. A residual category for unknown species from the incidental catch category is called "other fish." The following equations show how total state quantity and average prices of all fish landed by budget A were estimated.

$$ASQ_{im} = \alpha (SQ_{im}) \tag{1}$$

where:

ASQ_{im} = total state quantity of incidental species accounted for by the main species fishery of budget a

α = proportion of incidental catch by budget A

SQ_{im} = total state quantity of species that is incidental catch in both budgets A and B

is estimated using equation (2).

$$\alpha = \frac{\frac{A_i}{A_m} ASQ_m}{\frac{A_i}{A_m} ASQ_m + \left(\frac{B_i}{B_m} BSQ_m\right)}$$

where:

- A_i = quantity of incidental catch reported in budget A
- A_m = quantity of main species catch reported in budget A
- ASQ_m = total state landings of main species of budget A
- B_i = quantity of incidental catch reported in budget B
- B_m = quantity of main species catch reported in budget B
- BSQ_m = total state landings of main species of budget B.

The incidental catch allocated to the main species fishery of budget B is determined by equation (3).

$$BSQ_{im} = SQ_{im} - ASQ_m \quad (3)$$

where:

- BSQ_{im} = total state quantity of incidental species accounted for by the main species fishery of budget B.

The budget A main species fishery includes some budget B main species catch. This catch by the budget A fishery is included in the "other fish" category of budget A and this amount is reduced from projected state landings accounted for by the budget B main species fishery.

Average price of all fish in budget A is AP_f and is determined by equation (4). The average price of all fish in budget B is determined the same way.

$$AP_f = \frac{(ASP_m)(ASQ_m) + (ASP_i)(ASQ_{im}) + (ABP_{of})(AQ_{ofi})}{ASQ_m + ASQ_{im} + AQ_{ofi}} \quad (4)$$

where:

- ASP_m = average state price of main species of budget A

ASP_i = average state price of incidental catch species of budget A

ABP_{of} = average price of species in the other fish category of
budget A

AQ_{ofi} = estimated quantity of incidental catch species in budget
A that went to the other fish category.

APPENDIX B2

Estimation Procedures for Quantity and Average Price of All Fish Landed by the Florida Red Snapper- Grouper and Mullet Fisheries

Given: Budget A that lands a "main species" and several unknown species called "other fish." The following equations show how projected state quantity of other fish, and average price of all fish landed by the main species fishery of budget A were estimated.

$$QMS_{of} = \frac{(AQ_{of})}{AQ_{ms}} SQ_{ms} \quad (1)$$

$$AP_{msf} = \frac{(SP_{ms})(SQ_{ms}) + (BP_{of})(QMS_{of})}{SQ_{ms} + QMS_{of}} \quad (2)$$

where:

QMS_{of} = projected total state quantity of other fish landed by the main species fishery of budget A

AQ_{of} = quantity of other fish reported in budget A

AQ_{ms} = quantity of main species reported in budget A

SQ_{ms} = total state landings of main species from budget A

AP_{msf} = average price of all fish accounted for by main species fishery of budget A

SP_{ms} = average state price of main species of budget A

BP_{of} = average price reported by budget A for other fish.

APPENDIX B3

Estimation Procedure for Expenditures, Income, and Primary Economic Impact Per \$100 of Fish Landed in Florida

The following equation shows how expenditures, income, and primary economic impact per \$100 of fish landed were estimated.

$$E = \left(\frac{\$100}{P_f}\right) DQ_f \quad (1)$$

where:

E = expenditures, income, and primary economic impact per \$100 of fish landed

P_f = average price of fish per 100 pounds of fish

DQ_f = expenditures, income, and primary economic impact per 100 pounds of fish landed (items in column 1 of impact tables in text).

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