An Economic Analysis of the Southeast reef fish Processing Industry, 1973-1990

WALTER R. KEITHLY, JR.[1] and KENNETH J. ROBERTS[2]
[1]*Coastal Fisheries Institute, CCEER*
Wetland Resources Building
Louisiana State University
Baton Rouge, Louisiana 70803-7503
[2]*Louisiana Cooperative Extension Service*
Louisiana State University
Baton Rouge, Louisiana 70803

ABSTRACT

Management of species in the South Atlantic U.S. and Gulf of Mexico U.S. reef fish complexes has increased in recent years. The impacts of management, of course, extend beyond the dockside level. In particular, the processing sector must adjust to regulatory measures imposed at the harvesting level. These regulatory measures have been implemented with little consideration of the processing sector or impacts thereon.

This paper provides an economic analysis of the Southeast reef fish processing industry and is based upon National Marine Fisheries Service detailed processing records. The analysis, presented for the Southeast in aggregate and individually for the South Atlantic and Gulf Regions, focuses primarily on (1) aggregate reef fish processing activities, (2) grouper processing activities, and (3) red snapper processing activities.

Overall, results presented from this analysis can be incorporated into the fishery management framework. Such action will result in more informed management decision.

KEY WORDS: economics, grouper, processing, red snapper, reef fish.

INTRODUCTION

Commercial landings of edible finfish in the Southeast United States (defined as the coastal states of North Carolina through Texas) were valued in excess of $150 million dockside in 1990. More than a third of the total value was derived from species comprising what is referred to as the snapper-grouper complex. Classes of fish in this complex include the following families: snappers (Lutjanidae), temperate basses (Percichthyidae), sea basses (Serranidae), groupers (Serranidae), porgies (Sparidae), grunts (Haemulidae), spadefishes (Ephipidae), tilefishes (Malacanthidae), triggerfishes (Balistidae), wrasses (Labridae), and jacks (Carangidae).

Management of species in the snapper-grouper complex is increasing, particularly with respect to the commercial fishing industry, and has evolved with little consideration to potential impacts on the processing sector. To some degree, the lack of consideration reflects the limited formal research conducted in this area. Furthermore, the information which is available, *e.g.*, Prochaska and Keithly (1985) and University of Florida Sea Grant College (1981), is outdated and may no longer reflect current activities.

The purpose of this paper is to add to the body of research cited above by providing an economic analysis of the Southeast snapper-grouper complex processing industry. The analysis, which covers the 1973-90 period, is based on end-of-the-year processor responses to the annual National Marine Fisheries Service processor/wholesaler survey.

To assess processing activities, the paper begins by reviewing aggregate snapper- grouper complex landings and processing activities for the Southeast in total and separately for the South Atlantic Region (defined as the coastal states extending from North Carolina through the east coast of Florida) and Gulf Region (defined as the coastal states from the west coast of Florida through Texas). Together, these two regions comprise the Southeast. Then, attention is given to two key species - groupers and red snapper. These two species were chosen for separate analyses because (1) grouper processing activities are large relative to other species included in the snapper-grouper complex and (2) red snapper is currently of particular interest to the Gulf of Mexico Fishery Management Council and is the subject of substantial commercial fishing restrictions.

AGGREGATE ACTIVITIES

Aggregate Landings

Reported annual Southeast commercial landings of species in the snapper-grouper complex (hereafter referred to as reef fish) for the 1973-90 period are presented in Table 1 in three-year intervals. As indicated, landings have generally trended upwards with the 44.8 million pounds reported annually in 1988-90 exceeding the 1973-75 average annual landings of 26.4 million pounds by 70%. Low production occurred in 1976-78 when annual landings averaged 23.8 million pounds.

The current value of reported Southeast reef fish landings advanced from about $11 million annually in 1973-75 to almost $57 million annually in 1988-90 (Table 1). Much of this growth, however, was inflationary based. After adjusting for inflation (the 1990 Consumer Price Index was used as a base), the value of Southeast reef fish landings approximately doubled between 1973-75 and 1988-90, from an annual average of $29.2 million to an annual average of $59.6 million. Overall, the deflated value of Southeast reef fish landings increased consistently throughout the 18-year period of analysis when examined in three-year intervals, though the increase of less than $1.0 million during the most recent interval was minimal when compared to other interval increases.

Table 1. Reported Southeast Commercial Reeffish Landings, 1973-90.

Time Period	Pounds Landed 1,000s	VALUE Current $1,000s	VALUE Deflated[a] $1,000s	Deflated Price $/lb
1973-75 avg.	26,391	11,022	29,177	1.11
1976-78 avg.	23,773	15,637	33,301	1.40
1979-81 avg.	30,504	30,567	48,247	1.58
1982-84 avg.	37,708	40,635	53,128	1.41
1985-87 avg.	37,198	49,572	58,726	1.58
1988-90 avg.	44,775	56,621	59,573	1.33
AVERAGE	33,386	34,009	47,025	1.41

[a] The 1990 Consumer Price Index was used to deflate value and price. Source: Unpublished data provided by the National Marine Fisheries Service, Southeast Fisheries Center, Research Management Division.

The deflated Southeast reef fish dockside price, exhibited little, if any, upward trend during the 18-year study period when examined in three-year intervals (Table 1). Average annual deflated price of $1.33 per pound in 1988-90 exceeded the 1973-75 average annual deflated price of $1.11 per pound by 20% but was well below the reported deflated price during any other interval of analysis. A peak deflated price of $1.58 per pound occurred during both the 1979-81 and 1985-87 periods.

The sharp decline in the deflated Southeast reef fish dockside price during the most recent interval could reflect any number of factors including, but not limited to: (1) a change in composition of landed species within the snapper-grouper complex, (2) an increase in substitute products that compete with Southeast reef fish landings, particularly imports, or (3) a change in domestic supply. As indicated in Table 1, domestic supply increased by 7.6 million pounds during the most recent three-year interval which, ceteris paribus, would be expected to result in a reduction in price. Inferences regarding the possible impacts of the other two factors are alluded to throughout the paper.

Selected statistics related to reported reef fish landings in the South Atlantic and Gulf Regions of the United States are presented in Table 2. In the South Atlantic, reported landings averaged about 8.8 million pounds annually during 1973-90. In general, production in this region tended to increase throughout the 1973-90 period, when examined in three-year intervals, with the exception of a moderate decline in 1985-87. The 1988-90 average annual landings of 12.4 million pounds exceeded the 4.3 million pounds reported during the initial interval by about 190%. An increase in annual landings was particularly

Table 2. Reported South Atlantic and Gulf of Mexico Commercial Reeffish Landings, 1973-90.

	SOUTH ATLANTIC REGION	VALUE			GULF REGION	VALUE		
Time Period	Pounds Landed 1,000s	Current $1,000s	Deflated[a] $1,000s	Deflated Price $/lb	Pounds Landed 1,000s	Current $1,000s	Deflated $1,000s	Deflated Price $/lb
1973-75 avg.	4,274	1,962	5,166	1.21	22,117	9,060	24,011	1.09
1976-78 avg.	5,563	3,666	7,754	1.39	18,210	11,971	25,547	1.40
1979-81 avg.	9,765	7,406	11,706	1.20	20,739	23,161	36,541	1.76
1982-84 avg.	11,378	10,140	13,290	1.17	26,330	30,495	39,838	1.51
1985-87 avg.	9,279	10,782	12,776	1.38	27,919	38,790	45,950	1.65
1988-90 avg.	12,369	16,211	16,928	1.37	32,406	40,410	42,645	1.32
AVERAGE	8,771	8,361	11,270	1.28	24,620	25,648	35,755	1.45

[a] The 1990 Consumer Price Index was used to deflate value and price. Source: Unpublished data provided by the National Marine Fisheries Service, Southeast Fisheries Center, Research Management Division.

apparent in 1979- 81, when average annual landings of 9.8 million pounds exceeded the 5.6 million pounds reported during the previous interval of analysis by 75%.

In the Gulf Region, reported reef fish landings averaged 24.6 million pounds annually during the 18-year period ending in 1990 (Table 2). After declining from an average of 22.1 million pounds annually in 1973-75 to 18.2 million pounds annually in 1976-78, landings advanced strongly and ended the study period at 32.4 million pounds annually in 1988-90. Overall, the 1988-90 average annual landings in the Gulf Region exceeded the 1973-75 comparable figure by 47% which, while sizable, was substantially less than the percentage growth reported in the South Atlantic. However, average annual production in the Gulf Region during the study period exceeded that reported in the South Atlantic by a factor of almost three and was 160% larger than that reported in the South Atlantic during the most recent three-year period of analysis.

The deflated value of reported reef fish landings in the South Atlantic advanced from $5.2 million annually in 1973-75 to $16.9 million in 1988-90. For the same period in the Gulf Region, the deflated value advanced from $24.0 million annually to $42.6 million annually. As indicated by the information in Table 2, the deflated price in the South Atlantic exceeded that of the Gulf Region by $0.12 per pound during the initial interval of analysis. Through time, however, the Gulf Region deflated price advanced relative to that reported in the South Atlantic, and by 1979-81 the deflated Gulf Region reef fish price exceeded that reported in the South Atlantic by $0.56 per pound. This peak price differential coincided with the high observed price of $1.76 per pound in the Gulf Region. The Gulf Region deflated price has fallen sharply since 1979-81, particularly in the most recent interval of analysis. No such price reduction was evident in the South Atlantic. As such, the price differential declined sharply after 1979-81 and the South Atlantic deflated price, in fact, exceeded that reported in the Gulf Region by $0.05 per pound in 1988-90. Furthermore, a comparison of the information in Tables 1 and 2 indicates that the sharp decline in the Southeast deflated reef fish price during the most recent three-year period of analysis was Gulf Region based.

AGGREGATE PROCESSING ACTIVITIES

Number of Firms and Quantity

The number of Southeast U.S. firms engaged in reef fish processing activities increased during the 1973-90 period (Table 3). The 58 firms processing reef fish , on average, during 1988-90, for example, represented a 76% increase over the 33 firms reported annually in 1982-84 and more than a 250% increase over the 16 firms reported annually in 1973-75. Overall, growth in the number of firms was evident during each interval of analysis and was particularly apparent in 1988-90 with a reported net increase of 22 firms.

Table 3. Reeffish Processing Activities in the Southeast United States, 1973-90.

Time Period	No. of Firms	PROCESSED QUANTITY Product Weight (1,000 lbs)	PROCESSED QUANTITY Live Weight (1,000 lbs)	PROCESSED VALUE Current ($1,000s)	PROCESSED VALUE Deflated[a] ($1,000s)	PROCESSED PRICE (DEFLATED) Product Weight ($/lb)	PROCESSED PRICE (DEFLATED) Live Weight ($/lb)
1973-75 avg.	16	1,066	2,532	1,455	3,810	3.57	1.50
1976-78 avg.	18	630	1,749	1,486	3,205	5.09	1.83
1979-81 avg.	27	1,066	2,910	3,642	5,664	5.32	1.95
1982-84 avg.	33	2,141	6,037	8,268	10,842	5.06	1.80
1985-87 avg.	36	2,842	7,982	13,128	15,492	5.45	1.94
1988-90 avg.	58	3,988	11,121	17,599	18,472	4.63	1.66
AVERAGE	31	1,955	5,388	7,596	9,581	4.90	1.78

[a] The 1990 Consumer Price Index was used to deflate value and price. Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

While 16 firms were engaged in reef fish processing activities in the Southeast U.S., on average, during the 1973-75 period, a total of 25 unique firms were reported by the National Marine Fisheries Service for the period. For other three-year periods of analysis the numbers were: 27 firms in 1976-78, 47 firms in 1979-81, 43 firms in 1982-84, 54 firms in 1985-87, and 70 firms in 1988-90. These numbers indicate far more entry and exit in the Southeast reef fish processing industry than is indicated by examination of the three-year average number of firms. In four of the six intervals, in fact, the unique number of firms exceeded the interval average by 50% or more.

The quantity processed, as provided in Table 3, is reported on both a product-weight basis and an estimated live-weight equivalent basis. (See Keithly *et al.*, 1993, for a list of all conversion factors used to convert product weight to an estimated live-weight equivalent basis.) As indicated, the processed quantity, expressed on either a product weight or equivalent-live-weight basis, increased steadily during the period of analysis, when examined in three-year intervals, with the exception of a relatively sharp decline in 1976-78. Referring to Table 1, Southeast reef fish landings also declined sharply in that interval. Overall, pounds processed, expressed on a product weight basis, advanced from an average of 1.1 million pounds annually in 1973-75 to 4.0 million pounds in 1988-90, or by 275%. On an estimated live-weight equivalent basis, the increase was 340%, from 2.5 million pounds to 11.1 million pounds. Pounds processed (live-weight equivalent basis) as a proportion of Southeast reef fish landings increased from 9.6% in 1973-75 to 19.6% in 1988- 90 and peaked at 21.5% in 1985-87. Whether this increase reflects increased utilization of domestic landings in processing activities or increased import usage cannot be definitively answered based on the NMFS processing data, because the source of raw material supply is not addressed in the annual survey.

The current value of Southeast reef fish processing activities advanced from an average of \$1.5 million annually in 1973-75 to \$17.6 million annually in 1988-90 (Table 3). When adjusted for inflation, the value increased by a factor of 4.9, from \$3.8 million annually to \$18.5 million annually. The deflated processed price, while fluctuating widely on an interval basis, tended to reflect changes in the dockside price (see Table 1). For example, the peak deflated dockside price of \$1.58 per pound in the 1979-81 and 1985-87 periods coincided with peak processed prices of \$1.95 per pound and \$1.94 per pound (live-weight equivalent basis) while the low dockside price of \$1.11 per pound in 1973-75 coincided with the observed minimum deflated processed price of \$1.50 per pound (live-weight equivalent basis).

Of the 16 firms processing reef fish in the Southeast during 1973-75, five (31%) were located in the South Atlantic Region (Table 4). The remaining 11 firms (69%) were Gulf Region based. The South Atlantic share peaked in

Table 4. Reeffish Processing Activities in the South Atlantic and Gulf Regions, 1973-90.

Time Period	No. of Firms	PROCESSED QUANTITY Product Weight	PROCESSED QUANTITY Live Weight	PROCESSED VALUE Current	PROCESSED VALUE Deflated[a]	PROCESSED PRICE (DEFLATED) Product Weight	PROCESSED PRICE (DEFLATED) Live Weight
		1,000 lbs		$1,000s		$/lb	
				South Atlantic Region			
1973-75 avg.	05	636	1,361	848	2,242	3.53	1.65
1976-78 avg.	04	222	654	585	1,259	5.67	1.92
1979-81 avg.	14	584	1,679	2,255	3,486	5.97	2.08
1982-84 avg.	14	1,211	3,467	4,992	6,562	5.42	1.89
1985-87 avg.	15	1,224	3,540	6,327	7,467	6.10	2.11
1988-90 avg.	21	1,613	4,565	8,663	9,020	5.59	1.98
AVERAGE	12	915	2,544	3,945	5,006	5.47	1.97
				Gulf Region			
1973-75 avg.	11	430	1,171	608	1,568	3.64	1.34
1976-78 avg.	13	408	1,095	901	1,946	4.77	1.78
1979-81 avg.	13	482	1,231	1,387	2,178	4.52	1.77
1982-84 avg.	18	931	2,570	3,276	4,280	4.60	1.67
1985-87 avg.	21	1,618	4,442	6,802	8,025	4.96	1.81
1988-90 avg.	37	2,375	6,556	8,936	9,452	3.98	1.44
AVERAGE	19	1,041	2,844	3,652	4,575	4.39	1.61

[a] The 1990 Consumer Price Index was used to deflate value and price. Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

1979-81 at 52% and since then has fallen in the more narrow range of 36% to 42%. The low end of this range occurred in the most recent three-year period of analysis.

As was the case for the Southeast in total, the unique numbers of reef fish processing firms by region during each interval of analysis often tended to exceed the three-year average numbers by wide margins. In the South Atlantic, the unique numbers of firms reported during each three-year period are as follows: 7 firms in 1973-75, 6 firms in 1976-78, 25 firms in 1979-81, 20 firms in 1982-84, 27 firms in 1985-87, and 22 firms in 1988-90. Comparable figures for the Gulf Region are as follows: 18 firms in 1973-75, 21 firms in 1976-78, 22 firms in 1979-81, 23 firms in 1982-84, 27 firms in 1985-87, and 48 firms in 1988-90. In general, the growth in number of firms in the Gulf Region appears to have brought with it some stability. During the first three three-year periods of analysis, for example, the ratio of unique number of firms to average number of firms ranged from 59% to 64%. In each of the most recent three three-year intervals, however, the ratio has fallen in the narrow range of 28%-30%. While such a relationship was not as evident in the South Atlantic, it is noteworthy that the 22 unique firms reported in 1988-90 exceeded the three- year average by only one.

Processed poundage in the South Atlantic Region, evaluated on a product weight basis, advanced from an average of 636 thousand pounds annually in 1973-75 to 1.6 million pounds annually in 1988-90 (Table 4). In the Gulf Region, the increase was from 430 thousand pounds annually to 2.4 million pounds annually. In 1973-75, the South Atlantic Region contributed an average of 60% of the total Southeast reef fish processing activities in terms of poundage (product weight). By 1988-90, its contribution had fallen to 40%. Rapid expansion in processed poundage was evident in both Regions beginning in the 1982-84 period.

With the exception of the 1976-81 period, when reef fish processing activities in the Region were abnormally low, the processed poundage (live-weight equivalent basis) in the South Atlantic ranged from 30.5% (1982-84) to 38.2% (1985-87) of pounds landed. For the 18-year period, the average was 29.0%. In the Gulf Region, reef fish processing activities in relation to pounds landed increased steadily during the period of analysis. In 1973-75, for example, pounds processed in the Region averaged 5.3% of pounds landed, *i.e.*, 1.2 million pounds versus 22.1 million pounds. By 1982-84, the ratio had increased to 9.8% and in 1988-90, it equalled 20.2%. For the 18-year period ending in 1990, the ratio of processed poundage to pounds landed in the Gulf Region averaged 11.6%.

Examined on a deflated basis, the value of South Atlantic reef fish processing activities quadrupled during the period of analysis, from $2.2 million annually in 1973-75 to $9.0 million annually in 1988-90. In the Gulf Region, the increase was sixfold, from $1.6 million to $9.5 million. The deflated per pound processed price in the South Atlantic consistently exceeded that observed for the Gulf Region, whether examined on a product weight or live-weight basis. This is in contrast to the deflated dockside prices which were often higher in the Gulf Region. The higher priced processed products in the South Atlantic may reflect the use of higher valued species, more value-added processing activities, or some combination.

Industry Productivity

Productivity in the reef fish processing industry was examined on the basis of production per firm. In the Southeast, processed reef fish production per firm averaged 62.4 thousand pounds (product weight) annually during the 18-year period of analysis (Table 5). Production per firm peaked at about 80 thousand pounds in 1985-87 before falling almost 15% to 68.4 thousand pounds during the most recent interval of analysis. This decline came despite substantially higher total Southeast reef fish processed poundage (see Table 3). The observed decline in per firm productivity was associated with an increase in firm numbers from an average of 36 annually in 1985-87 to 58 annually in 1988-90. This suggests that there may have been insufficient raw material supplies needed to maintain the high firm output observed in 1985-87. Alternately, the entrants in the most recent interval of analysis may have had lower reef fish processing activities than their more established counterparts, hence, bringing down the industry average.

As with poundage, the per firm deflated value of reef fish processing activities peaked in 1985-87, at an annual average of $434 thousand (Table 5). The 1988-90 per firm deflated value of $317 thousand reflected a decline in processed poundage per firm as well as the sharp decline in the per pound processed price (see Table 3).

In general, per firm reef fish processing activities in the South Atlantic exceeded those in the Gulf Region, particularly when evaluated on the basis of value (Table 5). Over the entire period of analysis, processed poundage per firm in the South Atlantic averaged 76.2 thousand per year compared to 54.8 thousand in the Gulf Region, a difference of 39%. By value, the difference between regions was almost 75%. The observed differential between poundage and value reflects the substantially higher price received for the South Atlantic processed poundage (see Table 4).

Gross Marketing Margins

For purposes of this study, the gross marketing margin is defined as the difference between the price the processor receives for the processed product and the price he pays for an equivalent unit of product. The price the Southeast processor received for the processed product, converted to a live-weight basis, is

Table 5. Southeast and Regional Reeffish Processing Activities Expressed on a Per Firm Basis, 1973-90.

Time Period	SOUTHEAST U.S. Product Weight lbs	SOUTHEAST U.S. Deflated Value[a] $	SOUTH ATLANTIC Product Weight lbs	SOUTH ATLANTIC Deflated Value $	GULF Product Weight lbs	GULF Deflated Value $
1973-75 avg.	66,617	238,113	127,118	448,331	39,117	142,559
1976-78 avg.	35,637	181,423	51,235	290,561	30,568	145,953
1979-81 avg.	39,465	209,772	41,708	249,003	37,049	167,524
1982-84 avg.	65,545	331,892	84,451	457,812	50,764	233,447
1985-87 avg.	79,685	434,353	81,627	497,803	78,274	388,300
1988-90 avg.	68,367	316,888	76,792	429,542	63,628	253,177
AVERAGE	62,410	305,771	76,250	417,167	54,789	240,789

[a] The 1990 Consumer Price Index was used to deflate value. Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

given in Table 3. Assuming the dockside price adequately reflects the price paid by the processor for an equivalent unit of raw product (the validity of this assumption, of course, depends upon the degree to which imports are used in processing and the relative import price to domestic price), the gross marketing margin for Southeast reef fish processing activities can be estimated by subtracting the processed price, expressed on a live-weight equivalent basis, from the dockside price (Table 1). Similarly, estimated gross marketing margins for the South Atlantic and Gulf Regions can be estimated by subtracting the relevant dockside price information in Table 2 from the corresponding live-weight equivalent processed price in Table 4. The estimated margins for the Southeast and each region are presented in Table 6.

The gross marketing margin for the Southeast, as indicated, consistently averaged from $0.36 to $0.43 per live-weight pound of reef fish (deflated basis) when examined in three-year intervals, except during 1988-90 when it fell to $0.33 per live-weight pound. When converted to a product-weight basis (based upon the ratio of product weight to live weight in Table 3) the gross marketing margin ranged from a low of $0.93 (deflated) per product weight pound in 1988-90 to a high of $1.19 per product weight pound in 1976-78. It is noteworthy that the high gross marketing margin was received during a time period when processed supply was abnormally low and that the low gross marketing margin was received at the time period when processed supply was at an all time high.

A comparison of estimated gross marketing margins between the South Atlantic and Gulf Regions indicates considerably higher margins in the South Atlantic. While the information provided in this paper does not lend itself to determining the reason for this large differential, the answer may reflect additional value-added services provided by the South Atlantic reef fish processors. Additional analysis of reef fish processing activities by product form, however, would be required to definitively address this issue.

Reef Fish Processing Activities in Relation to Total Finfish Processing Activities

Reef fish , of course, comprise only one of many types of finfish processed in the Southeast United States. Other species (groups), including coastal migratory pelagics, flounders, sharks, and mullet, are also processed in large quantities.

As indicated in Table 7, an average of 28.2% of the Southeast edible finfish processing firms were engaged in reef fish processing activities on an annual basis over the 1973-90 period. In general, the proportion increased steadily throughout the 18-year study period when examined in three-year intervals and equalled 36.7% in 1988-90 compared to only 22.5% in 1973-75.

Though more than a quarter of the Southeast edible finfish processing firms

Table 6. Estimated Gross Marketing Margins in the Southeast and South Atlantic and Gulf of Mexico Reeffish Processing Industries[a],1973-90.

TimePeriod	SOUTHEAST Current	Deflated[b]	SOUTH ATLANTIC Current	Deflated	GULF Current	Deflated
	$/lb		$/lb		$/lb	
1973-75 avg.	0.16	0.39	0.17	0.44	0.11	0.25
1976-78 avg.	0.19	0.43	0.24	0.53	0.17	0.38
1979-81 avg.	0.25	0.37	0.58	0.88	0.02	0.01
1982-84 avg.	0.29	0.39	0.55	0.72	0.12	0.16
1985-87 avg.	0.31	0.36	0.63	0.73	0.14	0.16
1988-90 avg.	0.32	0.33	0.59	0.61	0.11	0.12

[a] Estimated gross marketing margins were derived by subtracting the dockside price from the corresponding processed price (equivalent live-weight basis).
[b] Estimated margins were deflated based on the 1990 Consumer Price Index.

were engaged in reef fish processing activities on an annual basis during 1973-90, only 5.1% of the total edible finfish processing activities, evaluated on a product-weight basis, were reef fish oriented. The proportion ranged from a low of 2.6% in 1976-78 to a high of 10.0% during the most recent interval of analysis. Evaluated on the basis of value, Southeast reef fish processing activities during 1973-90 averaged 10.6% of total edible finfish processing activities and, when examined in three-year intervals, ranged from a low of 5.5% annually in 1976-78 to a high of 16.3% in 1988-90. The differential in value and poundage ratios reflects the higher prices received for the processed reef fish products.

As noted, the 16 firms engaged in reef fish processing activities in 1973-75 represented 22.5% of the total finfish (edible) processing firms in the Southeast. However, processed reef fish represented only 7.4% of total processed finfish (edible) sales by value. This does not imply that reef fish processing firms are small relative to other finfish processors since reef fish processors can, and do, process other species of finfish. In 1973- 75, for instance, total processed finfish sales among Southeast reef fish processors averaged $6.25 million (deflated) annually, or about 12% of the total edible finfish sales among all finfish processors. Total deflated processed finfish sales among Southeast reef fish processors in other intervals of analysis are as follows: $7.1 million annually in 1976-78 (12.2% of total Southeast processed finfish sales), $13.9 million annually in 1979-81 (16.6%), $22.2 million annually in 1982-84 (20.7%), $30.5 million annually in 1985-87 (23.8%), and $43.6 million annually in 1988-90 (38.5%). This information indicates total processed finfish sales among

Table 7. Southeast Reeffish Processing Activities in Relation to Total Edible Finfish Processing Activities, 1973-90.

Time Period	NO. OF FIRMS			PROCESSED QUANTITY			DEFLATED PROCESSED VALUE[a]		
	Reeffish	Total Finfish	Percent Reeffish	Reeffish	Total Finfish	Percent Reeffish	Reeffish	Total Finfish	Percent Reeffish
	#		%	1,000 lbs		%	$1,000s		%
1973-75 avg.	16	71	22.5	1,066	24,106	4.4	3,810	51,685	7.4
1976-78 avg.	18	77	23.4	630	24,057	2.6	3,205	58,178	5.5
1979-81 avg.	27	115	23.5	1,066	36,299	2.9	5,664	83,573	6.8
1982-84 avg.	33	121	27.3	2,141	51,857	4.1	10,842	107,121	10.1
1985-87 avg.	36	124	29.0	2,842	53,652	5.3	15,492	128,045	12.1
1988-90 avg.	58	158	36.7	3,988	40,034	10.0	18,472	113,328	16.3
1973-90 avg.	31	111	28.2	1,956	38,334	5.1	9,581	90,322	10.6

[a] The 1990 Consumer Price Index was used to deflate value.

Southeast reef fish processors were approximately equal to other Southeast finfish processing firms by the 1988-90 period.

South Atlantic and Gulf of Mexico reef fish processing activities in relation to their respective total edible seafood processing activities are presented in Table 8. The Gulf Region, as indicated, tended to rely more heavily on reef fish in relation to total edible finfish processing activities. For example, 35% of the Gulf Region finfish processing firms utilized reef fish in their processing activities during 1973-90 compared to 21.4% of the South Atlantic firms. Furthermore, reef fish comprised 8.5% of the 1973-90 finfish processing activities in the Gulf Region by poundage compared to only 3.5% in the South Atlantic Region. By value, the reef fish processing activities comprised 15.4% of total finfish processing activities in the Gulf Region compared to 8.2% in the South Atlantic Region.

Total deflated processed finfish sales among South Atlantic reef fish processors for each interval of analysis were as follows: $4.3 million annually in 1973-75 (11.2% of total edible South Atlantic processed finfish sales), $3.3 million annually in 1976-78 (8.1%), $7.4 million annually in 1979-81 (12.4%), $15.0 million annually in 1982-84 (20.5%), $18.4 million annually in 1985-87 (22.5%), and $28.8 million annually in 1988-90 (41.9%). Comparable numbers for the Gulf Region were: $1.9 million annually in 1973-75 (14.95%), $3.8 million annually in 1976-78 (22.3%), $6.5 million annually in 1979-81 (27.5%), $7.1 million annually in 1982-84 (21.2%), $12.0 million annually in 1985-87 (26.1%), and $14.6 million annually in 1988-90 (32.8%). In general, these numbers indicate that as the proportion of reef fish firms in each region increased, so did the proportion of their total processed finfish sales.

INDIVIDUAL SPECIES ACTIVITIES

As noted in the Introduction, analysis was also conducted on two key species. These were grouper and red snapper. Significant findings are presented in this section.

Groupers

Reported Southeast commercial grouper landings for the 1973-90 periods are presented in Table 9. Pounds harvested increased from an average of 7.6 million pounds annually in 1973-75 to 14.7 million pounds annually in 1985-87, before declining moderately to 13.5 million pounds annually in 1988-90. Overall, the 13.5 million pounds harvested annually in 1988-90 reflected about a 75% increase over the 7.6 million pounds harvested annually in 1973-75.

The deflated value of Southeast grouper landings in 1988-90, averaging $25 million annually, exceeded the average annual deflated value of $6.9 million in 1973-75 by more than 260%. The sharp rise in deflated value relative to pounds landed reflected a significant increase in the per pound deflated price which

Table 8. South Atlantic and Gulf of Mexico reeffish processing activities in relation to each region's total edible finfish processing activities.

Time Period	NO. OF FIRMS			PROCESSED QUANTITY			DEFLATED PROCESSED VALUE[a]		
	Reeffish	Total Finfish	Percent Reeffish	Reeffish	Total Finfish	Percent Reeffish	Reeffish	Total Finfish	Percent Reeffish
	#		%	1,000 lbs		%	$1,000s		%
South Atlantic Region									
1973-75 avg.	05	30	16.7	636	18,042	3.5	2,242	38,753	5.8
1976-78 avg.	04	41	9.80	222	16,893	1.3	1,259	41,256	3.1
1979-81 avg.	14	78	18.0	584	24,717	2.4	3,486	59,914	5.8
1982-84 avg.	14	73	19.2	1,211	35,494	3.4	6,562	73,531	8.9
1985-87 avg.	15	59	25.4	1,224	35,163	3.5	7,467	82,030	9.1
1988-90 avg.	21	61	34.4	1,613	26,422	6.1	9,020	68,766	7.6
AVERAGE	12	57	21.4	915	26,122	3.5	5,006	60,708	8.2
Gulf Region									
1973-75 avg.	11	41	26.8	430	6,063	7.1	1,568	12,932	12.1
1976-78 avg.	13	36	36.1	408	7,164	5.7	1,946	16,922	11.5
1979-81 avg.	13	37	35.1	482	11,582	4.1	2,178	23,660	9.2
1982-84 avg.	18	48	37.5	931	16,363	5.7	4,280	33,590	12.7
1985-87 avg.	21	65	32.3	1,618	18,489	8.8	8,025	46,015	17.4
1988-90 avg.	37	96	38.5	2,375	13,612	17.5	9,452	44,563	21.2
AVERAGE	19	54	35.0	1,041	12,212	8.5	4,575	29,614	15.4

[a] The 1990 Consumer Price Index was used to deflate value.

Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division,

Table 9. Reported Southeast Commercial Grouper Landings, 1973-90.

Time Period	Pounds Landed 1,000s	VALUE Current $1,000s	VALUE Deflated[a] $1,000s	Deflated Price $/lb
1973-75 avg.	7,646	2,611	6,850	0.90
1976-78 avg.	7,656	4,356	9,302	1.22
1979-81 avg.	10,526	9,599	15,076	1.43
1982-84 avg.	13,687	15,742	20,567	1.50
1985-87 avg.	14,676	23,424	27,413	1.87
1988-90 avg.	13,518	23,855	25,098	1.86
AVERAGE	11,285	14,199	18,413	1.63

[a] The 1990 Consumer Price Index was used to deflate value and price. Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Southeast Fisheries Center, Research Management Division.

averaged $1.86 per pound in 1988-90 compared to only $0.90 per pound in 1973-75.

As suggested by the information in Table 10, the Gulf Region dominates Southeast grouper landings. On average, pounds landed in the Gulf Region during the 18-year period of analysis equalled 9.3 million annually compared to only 2.0 million in the South Atlantic Region. The deflated price in the South Atlantic, in general, exceeded that reported for the Gulf Region by about $0.10 to $0.15 per pound with the exception of the 1979-84 period.

Selected statistics on Southeast U.S. grouper processing activities are presented for the 1973-90 period in Table 11. As indicated, the number of firms advanced from an average of 13 annually in 1973-75 to 45 annually in 1988-90. The 1979-81 and 1988-90 periods both exhibited pronounced increases in firm numbers.

A comparison of firm numbers in Table 11 with those in Table 3 indicates that the vast majority of Southeast reef fish processing firms were engaged in grouper processing activities during the period of analysis. In 1973-75, for instance, the proportion was 81% (13 of 16) and for the entire 18-year study period the proportion was also 81% (25 of 31).

Southeast grouper processing activities, expressed on a product weight basis, advanced from an average of about 700 thousand pounds annually in 1973-7 to 2.2 million pounds annually in 1988-90. Examined on a product-weight basis, Southeast grouper processing activities generally represented from 55% to 65% of the total Southeast reef fish processing activities.

Table 10. Reported Commercial South Atlantic and Gulf of Mexico Grouper Landings, 1973-90.

	SOUTH ATLANTIC REGION				GULF REGION			
		VALUE				VALUE		
Time Period	Pounds Landed 1,000s	Current $1,000s	Deflated[a] $1,000s	Deflated Price $/lb	Pounds Landed 1,000s	Current $1,000s	Deflated $1,000s	Deflated Price $/lb
1973-75 avg.	861	344	898	1.04	6,785	2,267	5,952	0.88
1976-78 avg.	1,557	956	2,009	1.29	6,098	3,399	7,293	1.20
1979-81 avg.	2,179	1,947	3,085	1.42	8,346	7,652	11,992	1.44
1982-84 avg.	2,548	2,803	3,653	1.43	11,139	12,939	16,914	1.52
1985-87 avg.	2,303	3,842	4,541	1.97	12,373	19,581	22,872	1.85
1988-90 avg.	2,390	4,539	4,762	1.99	11,129	19,316	20,336	1.83
AVERAGE	1,973	2,405	3,158	1.60	9,312	10,859	14,227	1.53

[a] The 1990 Consumer Price Index was used to deflate value and price.
Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Southeast Fisheries Center, Research Management Division.

Table 11. Grouper Processing Activities in the Southeast United States, 1973-90.

Time Period	No. of Firms	PROCESSED QUANTITY Product Weight	Live Weight	PROCESSED VALUE Current	Deflated[a]	PROCESSED PRICE (DEFLATED) Product Weight	Live Weight
		1,000 lbs		$1,000s		$/lb	
1973-75 avg.	13	697	1,381	707	1,867	2.68	1.35
1976-78 avg.	13	333	829	656	1,413	4.24	1.70
1979-81 avg.	23	656	1,652	2,042	3,171	4.84	1.92
1982-84 avg.	28	1,229	3,231	4,135	5,433	4.42	1.68
1985-87 avg.	29	1,578	4,129	7,352	8,669	5.49	2.10
1988-90 avg.	45	2,203	5,788	10,369	10,935	4.96	1.89
AVERAGE	25	1,116	2,835	4,210	5,248	4.70	1.85

[a] The 1990 Consumer Price Index was used to deflate value and price.
Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

On a deflated basis, the value of Southeast grouper processing activities increased from $1.9 million annually in 1973-75 to $10.9 million annually in 1988-90. In 1973-75, grouper represented 49% of the total value of Southeast reef fish processing activities. By 1988-90, its relative share had increased to almost 60%. Much of the increased processed grouper share by value reflects a high processed grouper price during the most recent two intervals of analysis vis-a-vis the processed reef fish price in aggregate.

Southeast processed grouper pounds (live-weight equivalent basis) as a proportion of Southeast grouper landings averaged 18.1% in 1973-75. After a pronounced decline to 10.8% in the next interval, the proportion increased steadily during each of the remaining periods of analysis, ending at 42.8% in 1988-90. This increase could represent (a) increased domestic product utilization in processing activities, (b) increased import usage in Southeast processing activities, or (c) some amalgamation of increased domestic product usage and increased import usage.

The gross marketing margin for Southeast grouper processing activities, defined as the processed per pound price expressed on a live-weight equivalent basis (Table 11) less the per pound dockside price (Table 9), averaged $0.22 per whole weight pound (deflated) during the 18-year period of study. Converted to a product-weight basis, the deflated gross margin averaged $0.56 per pound. Examined in three-year intervals, the deflated gross marketing margin never fell below $0.45 per pound during the first three intervals of analysis yet never exceeded $0.23 per pound during the most recent three intervals. And, it equaled only $0.03 in 1988-90. The declining gross margin in recent years could reflect increased competition brought forth by the expansion in firm numbers and product output. Alternately, it may reflect use of a less expensive imported product in which case, the use of dockside price to estimate the gross margin would be inappropriate. As noted, the NMFS processor survey data does not permit one to differentiate domestic versus imported product usage in processing activities.

Grouper processing activities in the South Atlantic and Gulf Region are presented in Table 12. A few salient features include the following. First, processed poundage (live- weight equivalent basis) in the South Atlantic as a percentage of the region's landings was historically much higher than that observed for the Gulf Region, 56.7% during the 18-year period of analysis versus 18.4%. Second, the deflated processed grouper price in the South Atlantic has been significantly higher than that reported for the Gulf Region since 1979-81. Finally, both regions have shown a large increase in firm numbers during the 18-year period of analysis.

While discussion has been given to the potential use of imported grouper in Southeast processing activities, no evidence has yet been provided that significant quantities of imported grouper enter the U.S. The U.S. Department of

Table 12. Grouper Processing Activities in the South Atlantic and Gulf Regions, 1973-90.

Time Period	No. of Firms	PROCESSED WEIGHT Product Weight	PROCESSED WEIGHT Live Weight	PROCESSED VALUE Current	PROCESSED VALUE Deflated[a]	PROCESSED PRICE (DEFLATED) Product Weight	PROCESSED PRICE (DEFLATED) Live Weight
		1,000 lbs		$1,000s		$/lb	
South Atlantic Region							
1973-75 avg.	03	396	613	373	995	2.51	1.62
1976-78 avg.[b]	02	72	189	135	292	4.06	1.54
1979-81 avg.	12	274	721	980	1,523	5.56	2.11
1982-84 avg.	11	587	1,544	2,127	2,791	4.75	1.81
1985-87 avg.	12	539	1,416	2,888	3,405	6.32	2.40
1988-90 avg.	18	851	2,234	4,618	4,832	5.68	2.16
AVERAGE	12	453	1,119	1,853	2,306	5.09	2.06
Gulf Region							
1973-75 avg.	10	301	767	334	872	2.90	1.14
1976-78 avg.	11	261	640	521	1,121	4.29	1.75
1979-81 avg.	11	382	931	1,062	1,649	4.32	1.77
1982-84 avg.	17	642	1,687	2,009	2,643	4.12	1.57
1985-87 avg.	17	1,040	2,713	4,464	5,264	5.06	1.94
1988-90 avg.	27	1,352	3,553	5,751	6,104	4.51	1.72
AVERAGE	16	663	1,715	9,349	2,942	4.43	1.72

[a] The 1990 Consumer Price Index was used to deflate value and price.
[b] While less than three firms reported processed grouper activities in the South Atlantic, on average, during 1976-78, three or more separate firms reported processing activities during the period. Hence, no confidential data is released in these numbers.
Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

Commerce did not initiate collection of grouper import data until July of 1990. For the six months ending in December 1990, imports of whole grouper

Table 13. Reported Southeast Commercial Red Snapper Landings, 1973-90.

Time Period	Pounds Landed 1,000s	VALUE Current $1,000s	Deflated[a]	Deflated Price $/lb
1973-75 avg.	8,697	5,898	15,653	1.80
1976-78 avg.	6,329	6,348	13,668	2.16
1979-81 avg.	5,386	8,514	13,511	2.51
1982-84 avg.	6,410	11,488	15,014	2.34
1985-87 avg.	4,079	8,577	10,180	2.50
1988-90 avg.	3,493	8,347	8,850	2.53
AVERAGE	5,732	8,195	12,813	2.24

[a] The 1990 Consumer Price Index was used to deflate value and price.
Source: Unpublished data provided by the National Marine Fisheries Service, Southeast Fisheries Center, Research Management Division.

equalled 4.2 million pounds to the U. S., suggesting more than adequate raw material import supply for domestic processing.

Red Snapper

Reported Southeast commercial red snapper landings for the 1973-90 period are presented in Table 13. Red snapper processing activities for the Southeast are presented in Table 14. As indicated, landings have generally declined throughout the 18-year study period when examined in three-year intervals with the exception of a moderate increase during the 1982-84 period. The number of Southeast firms processing red snapper was relatively small, averaging 13 annually during the 18-year study period.

Pounds processed, evaluated on a live-weight equivalent basis, averaged 1.2 million annually during the study period and, when examined in intervals, ranged from a low of about 800 thousand annually in 1976-78 to a high of 2.2 million annually in 1982-84. In general, the pounds processed (live-weight equivalent basis) as a proportion of pounds landed increased substantially beginning in the 1982-84 period and averaged 25% or more during each of the most recent three intervals. Before 1982-84, pounds processed as a proportion of pounds landed never exceeded 15% in any interval of analysis.

Interestingly, the estimated gross marketing margin of Southeast red snapper processing activities, expressed on a per pound basis, was consistently negative during the period of study, except during the first interval of analysis.

Table 14. Red Snapper Processing Activities in the Southeast United States, 1973-1990.

Time Period	No. of Firms	PROCESSED QUANTITY Product Weight	PROCESSED QUANTITY Live Weight	PROCESSED VALUE Current	PROCESSED VALUE Deflated[a]	PROCESSED PRICE (DEFLATED) Product Weight	PROCESSED PRICE (DEFLATED) Live Weight
		1,000 lbs		$1,000s		$/lb	
1973-75 avg.	10	293	912	648	1,672	5.72	1.83
1976-78 avg.	12	269	839	784	1,693	6.30	2.02
1979-81 avg.	15	255	797	1,133	1,779	6.97	2.23
1982-84 avg.	16	701	2,176	3,168	4,163	5.94	1.91
1985-87 avg.	13	593	1,849	3,080	3,659	6.17	1.98
1988-90 avg.	14	278	867	1,551	1,632	5.87	1.88
AVERAGE	13	398	1,240	1,727	2,433	6.11	1.96

[a] The deflated value and price is based on the 1990 Consumer Price Index.
Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division.

Table 15. Reported South Atlantic and Gulf of Mexico Commercial Red Snapper Landings, 1973-1990.

	SOUTH ATLANTIC REGION				GULF REGION			
		VALUE				VALUE		
Time Period	Pounds Landed 1,000s	Current $1,000s	Deflated[a] $1,000s	Deflated Price $/lb	Pounds Landed 1,000s	Current $1,000s	Deflated $1,000s	Deflated Price $/lb
1973-75 avg.	566	534	1,396	2.46	8,131	5,363	14,257	1.75
1976-78 avg.	600	961	2,049	3.41	5,729	5,387	11,619	2.03
1979-81 avg.	388	811	1,306	3.37	4,998	7,703	12,205	2.44
1982-84 avg.	289	664	870	3.01	6,121	10,824	14,171	2.32
1985-87 avg.	220	571	677	3.08	3,859	8,006	9,503	2.46
1988-90 avg.	220	615	645	2.93	3,273	7,732	8,205	2.51
AVERAGE	381	693	1,157	3.04	5,352	7,503	11,660	2.18

[a] The 1990 Consumer Price Index was used to deflate value and price.
Source: Unpublished data provided by the National Marine Fisheries Service, Southeast Fisheries Center, Research Management Division.

Table 16. Red Snapper Processing Activities in the South Atlantic and Gulf Regions, 1973-1990.

Time Period	No. of Firms	PROCESSED QUANTITY Product Weight (1,000 lbs)	PROCESSED QUANTITY Live Weight (1,000 lbs)	PROCESSED VALUE Current ($1,000s)	PROCESSED VALUE Deflated[a] ($1,000s)	PROCESSED PRICE (DEFLATED) Product Weight ($/lb)	PROCESSED PRICE (DEFLATED) Live Weight ($/lb)
South Atlantic Region							
1973-75 avg.	03	166	519	378	985	5.92	1.90
1976-78 avg.	04	128	401	412	885	6.90	2.21
1979-81 avg.	10	193	601	934	1,447	7.51	2.41
1982-84 avg.	10	569	1,766	2,719	3,580	6.29	2.03
1985-87 avg.	07	438	1,366	2,357	2,800	6.39	2.05
1988-90 avg.	09	176	550	1,128	1,185	6.73	2.16
AVERAGE	07	278	867	1,321	1,814	6.53	2.09
Gulf Region							
1973-75 avg.	07	126	393	270	687	5.45	1.75
1976-78 avg.	08	141	438	372	808	5.75	1.84
1979-81 avg.	06	63	196	199	332	5.29	1.70
1982-84 avg.	07	132	410	450	583	4.44	1.42
1985-87 avg.	05	155	484	722	859	5.54	1.78
1988-90 avg.	06	102	317	423	447	4.40	1.41
AVERAGE	06	120	373	406	619	5.16	1.65

[a] The 1990 Consumer Price Index was used to deflate value and price.

Source: Compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division, Silver Spring, MD.

One probable explanation for this finding is that processing occurs only when landings are high and the corresponding dockside price is low. Alternately, it is likely that the larger red snapper are processed while the smaller ones are used in restaurant trade. To the extent that larger red snapper receive a lower per pound price at dockside, the estimated marketing margins will be misleading.

Reported South Atlantic and Gulf Region red snapper landings for 1973-90 are provided in Table 15. Corresponding processing activities, by region, are presented in Table 16. As indicated, red snapper processing activities in the South Atlantic have historically been significantly higher than those reported in the Gulf Region, despite the fact that South Atlantic red snapper landings are generally less than 10% of those reported in the Gulf Region. Furthermore, the South Atlantic deflated processed red snapper price consistently exceeded that reported in the Gulf Region by a wide margin. This was also the case with respect to dockside price.

Overall, South Atlantic red snapper processing activities, evaluated on a live-weight equivalent basis, have consistently exceeded the region's reported landings by a substantial amount since 1979-81. This suggests that the South Atlantic processors rely heavily on either Gulf red snapper landings or foreign country imports for much of their raw material supply.

Processed red snapper supplies in the Gulf Region, by comparison, were relatively limited in relation to pounds landed, averaging just 7.0% during the 18-year study period. Peak processing activities in relation to pounds landed occurred in 1985-87 when the proportion was 18.7%.

ACKNOWLEDGEMENTS

The authors acknowledge support from the National Marine Fisheries Service, Saltonstall-Kennedy Project # NA90AA-H-SK053.

LITERATURE CITED

Keithly, W. R., Jr., K. J. Roberts, and H. E. Kearney. 1993. The southeastern seafood processing industry: An economic assessment for private and public management decision making. Final Report to National Marine Fisheries Service (Contract No. NA90AA-H-SK-53).

Prochaska, F. J. and W. R. Keithly. 1985. Region, market outlet and product form distribution of Gulf of Mexico landed grouper. Pages 329-336 in R. Nickelson, ed. *Proceedings of the Ninth Annual Tropical and Subtropical Fisheries Technological Conference of the Americas*, Texas A&M University Sea Grant College Program, TAMU-SG-85-106.

University of Florida Sea Grant College [Revised by Gulf Council]. 1981. Environmental Impact Statement and Fishery Management Plan for the Reef Fish Resources of the Gulf of Mexico.