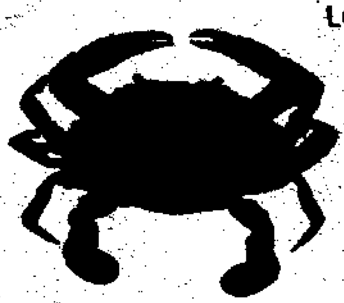
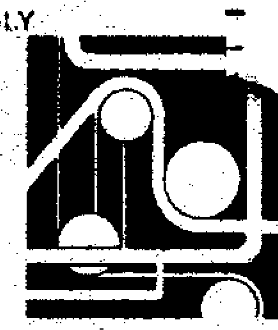
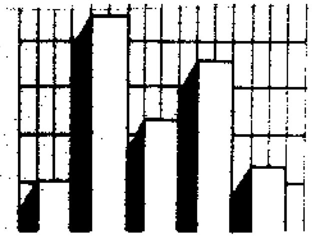
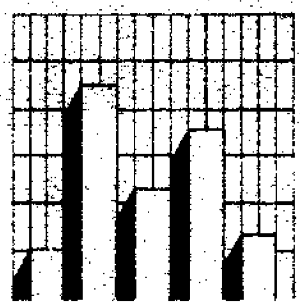
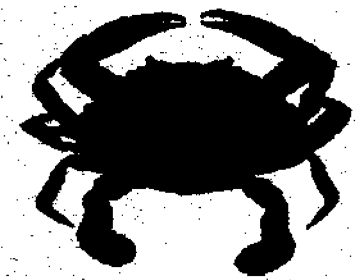
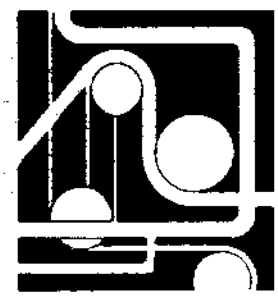
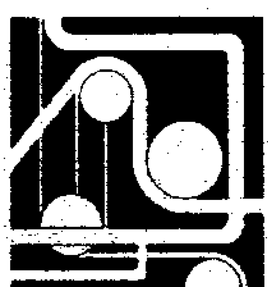
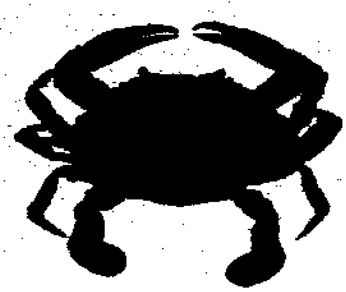
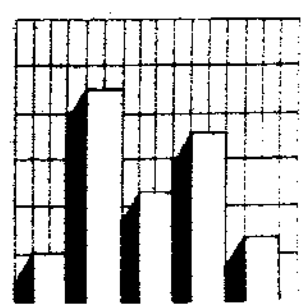
  

LOUISIANA BLUE CRAB

PRODUCTION, PROCESSING, AND MARKETS

WALTER R. KEITHLY, JR. KENNETH J. ROBERTS ANDREA W. LIEBZEIT

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ERRATA

1. The 1987 value of Louisiana's blue crab landings on page 6 should read 20,134 (deflated value equals 5,915).

2. All information in TABLE 3 (page 8) is in thousands of dollars.

LOUISIANA BLUE CRAB PRODUCTION, PROCESSING, AND MARKETS

by

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Introduction

The blue crab fishery, in view of its dockside value, is becoming an increasingly important component of the Louisiana fishing sector. Worth $20.1 million in 1987, the Louisiana blue crab fishery was exceeded in dockside value only by shrimp ($184.2 million), menhaden ($55.1 million), and oysters ($31.0 million).

The blue crab fishery of Louisiana also provides an important source of employment in many of the economically depressed regions of the state. According to the Louisiana Department of Wildlife and Fisheries (personal communication Janice Sharkey), the sales of resident commercial crab licenses (LDWF code 144046), for instance, were 2,879 in 1987 compared with only 1,985 the previous year. Employment and output in the harvesting sector create, in turn, additional employment in wholesaling and processing activities. Wholesaling activities include the grading of commercial crab catches according to sex and size and resale of the live product to local restaurants and retail outlets, local processors, and out-of-state buyers. Processors pick the crabs and provide other value-added services, such as repackaging, and sell the processed product both locally and out of state. These activities, though by no means small, are generally believed to have room for growth and, in fact, appear to have been expanded in recent years.

Despite the economic significance of the Louisiana blue crab fishery, it has received relatively little research emphasis. Furthermore, the economic research that has been performed is based at the harvesting level (see, for example, Roberts and Thompson 1982) rather than at the wholesaling and processing levels. The overall goal of this report, therefore, is to provide an economic analysis of the Louisiana blue crab wholesaling, processing, and distribution network.

The analysis serves several purposes. First, it provides established Louisiana dealers (i.e., wholesalers and processors) with a benchmark from which to compare their own practices. Second, it provides lending institutions and potential investors with information to help them better assess the current status of the Louisiana blue crab industry and thus make more informed decisions. Finally, the analysis will help industry and government efforts aimed at evaluating market legislation, management alternatives, and seafood promotion and marketing strategies.

As a basis for examining the current status of the Louisiana blue crab industry, this report begins with an historical overview of the Louisiana, Gulf of Mexico region (defined as the coastal states from Texas through Alabama and the west coast of Florida), and national blue crab production and processing activities. A descriptive analysis of the Louisiana blue crab wholesaling and processing sector will then be given. This analysis is primarily based on results of a survey conducted by the authors in the spring of 1987. Finally, a summary is provided along with recommendations for future research.

Historical Landings and Processing Activities

Historical Landings Activities

The blue crab industries of the U.S. and Gulf of Mexico region (hereafter referred to as the Gulf region) begin at the harvesting level. Landings provide a source of supply for wholesaling and processing activities. Crab supply increases and decreases translate into interruptions in economic growth in processing and marketing activities. Because employment and income impacts are volatile in this supply climate, it is important to examine historical production trends.

Reported commercial blue crab landings in Louisiana, though exhibiting considerable year-to-year variation, have increased in the long run (Table 1). Averaging about 17.6 million pounds annually during 1971-75, Louisiana's landings fell slightly to 17.2 million pounds annually during 1976-80 before increasing substantially to 22.5 million pounds annually during 1981-85. A sharp increase in landings occurred after 1983 with successive harvesting records being set each year thereafter. The 32 million pounds of crabs produced in Louisiana in 1986 are meager when compared with the 1987 production of 52 million pounds. These increased landings probably reflect increased fishing activities in response to the decline in coastal Louisiana's oil and gas related activities. With relatively low fixed-investment requirements (see Roberts and Thompson 1982 for details) and an apparent abundance of crabs, crabbing was well suited for increased commercial fishing activities.

Along with the volume, the value of Louisiana's reported blue crab landings has been increasing. Because of the combination of increasing volume and increasing dockside price, however, the value of Louisiana blue crab landings has been increasing more rapidly than volume. Averaging $2.2 million per year during 1971-75, the value of Louisiana's blue crab landings increased to an average of $3.8 million annually during 1976-80 and increased again to almost $6.5 million annually during 1981-85 (Table 2). Value in 1986, equalling $9.3 million, was surpassed only by the 1987 reported value of more than $20 million.

Much of the increase in value of Louisiana's blue crab landings can, of course, be attributed to inflation, i.e., the upward trend in prices throughout the U.S. economy. Removing the upward trend in value caused by inflationary effects gives value in what is termed deflated dollars.[1] Expressed this way, the value of Louisiana blue crab landings increased from about $1.6 million annually during 1971-75 to about $2.1 million during 1981-85, or 35 percent. This increase is considerably less than the 190 percent increase in undeflated value (i.e., $2.2 million to $6.5 million). The 1987 deflated value of $5.92 million was almost three times that observed just four years earlier, i.e., $2.1 million in 1983.

The deflated blue crab value can increase as a result of two factors. First, the deflated dockside price of blue crab harvest can increase. Second, poundage can increase. Further examination of the data suggests that the increase in the deflated dockside value of Louisiana blue crab landings is largely the result of increased poundage because the deflated price per pound of Louisiana's blue crab landings has changed very little over the last 25 years (Table 2). Current, or undeflated, price has, however, increased from an average of $0.125 per pound during 1971-75 to $0.287 per pound during 1981-85 and has reached $0.38 per pound in 1987 (Table 2).

Louisiana, as indicated in Table 1, contributes significantly to the Gulf region and national blue crab poundage. Louisiana's landings during the 1971-75 period, for example, represented an average of 46 percent of the 38.3 million pounds annually harvested in the Gulf region and 12.3 percent of the U.S. production of 143.4 million pounds. Louisiana's share of the 42 million pounds produced in the Gulf region during 1981-85 increased to 54 percent, while its share of the 194.9 million pounds produced in the U.S., 11.6 percent, was slightly less than the 12.4 percent share exhibited during 1971-75 (derived from Table 1). Because of the extremely large increase in 1987 Louisiana landings, more than three-quarters of the Gulf region production and about quarter of U.S. production was derived from Louisiana waters in the most recent year.

The value of Louisiana's commercial blue crab landings in relation to comparable statistics at the Gulf region and national level exhibits a similar pattern to that of poundage.

Table 1. Historical Commercial Volume of Blue Crab Landings for Louisiana, the Gulf of Mexico Region, and the United States, 1971-87.

	Louisiana	Gulf Region	United States
	---------- thous. lbs. ----------		
1971	12,186	33,531	149,081
1972	15,053	35,195	147,468
1973	23,080	43,473	136,516
1974	20,640	40,355	149,176
1975	17,144	38,728	134,742
1971-75	17,627	38,258	143,397
1976	15,211	36,561	115,434
1977	16,154	44,328	133,630
1978	15,074	37,895	138,230
1979	21,333	38,181	152,830
1980	18,182	41,006	163,206
1976-80	17,191	39,594	140,666
1981	16,236	37,402	195,114
1982	17,284	35,902	195,476
1983	19,616	36,153	191,754
1984	29,617	50,982	201,556
1985	29,848	49,378	190,524
1981-85	22,520	41,963	194,885
1986	31,611	55,454	184,491
1987[a]	52,344	75,269	197,826

Sources: Compiled from Fishery Statistics of the United States (various issues), unpublished National Marine Fisheries Service data, and Vondruska (1986).

[a]1987 data are preliminary.

Table 2. Historical Commercial Value and Prices of Blue Crab Landings for Louisiana, the Gulf of Mexico Region, and the United States, 1971-87.

Year	Louisiana		Gulf Region		United States	
	Value	Price	Value	Price	Value	Price
	($1,000's)	Doll./lb.	($1,000's)	Doll./lb.	($1,000's)	Doll./lb.
1971	1,256 (1,035)	0.103 (0.085)	3,113 (2,566)	0.093 (0.077)	12,921 (10,652)	0.087 (0.072)
1972	1,777 (1,418)	0.118 (0.094)	3,753 (2,995)	0.109 (0.085)	14,671 (11,709)	0.099 (0.079)
1973	2,811 (2,112)	0.122 (0.092)	5,313 (3,992)	0.122 (0.092)	17,661 (13,269)	0.129 (0.097)
1974	2,701 (1,829)	0.131 (0.089)	5,324 (3,605)	0.132 (0.089)	19,259 (13,039)	0.129 (0.087)
1975	2,510 (1,557)	0.146 (0.091)	5,503 (3,414)	0.142 (0.088)	20,310 (12,599)	0.151 (0.094)
1971-75 Avg.	2,211 (1,590)	0.125 (0.090)	4,601 (3,314)	0.120 (0.087)	16,664 (12,254)	0.117 (0.085)
1976	3,061 (1,795)	0.201 (0.118)	6,755 (3,962)	0.185 (0.109)	23,563 (13,820)	0.204 (0.119)
1977	3,765 (2,074)	0.233 (0.218)	9,852 (3,374)	0.199 (0.110)	28,060 (15,460)	0.213 (0.117)

Table 2. (Continued)

Year	Louisiana		Gulf Region		United States	
	Value	Price	Value	Price	Value	Price
	($1,000's)	Doll./lb.	($1,000's)	Doll./lb.	($1,000's)	Doll./lb.
1978	3,189 (1,633)	0.212 (0.109)	8,203 (4,200)	0.218 (0.112)	28,180 (14,429)	0.204 (0.014)
1979	4,776 (2,197)	0.224 (0.103)	8,658 (3,983)	0.228 (0.105)	31,420 (14,453)	0.206 (0.094)
1980	4,327 (1,753)	0.238 (0.096)	10,041 (4,184)	0.242 (0.098)	35,167 (14,249)	0.215 (0.087)
1976-80 Avg.	3,824 (2,890)	0.222 (0.110)	8,245 (4,048)	.216 (0.106)	29,278 (14,345)	0.209 (0.103)
1981	4,468 (1,640)	0.275 (0.101)	9,640 (4,065)	0.262 (0.096)	46,441 (17,049)	0.238 (0.087)
1982	4,843 (1,675)	0.280 (0.097)	10,341 (3,548)	0.279 (0.097)	49,407 (17,090)	0.253 (0.088)
1983	6,366 (2,133)	0.325 (0.109)	11,607 (3,916)	0.321 (0.108)	55,131 (18,663)	0.288 (0.097)
1984	8,191 (2,633)	0.277 (0.089)	15,004 (5,032)	0.278 (0.089)	55,973 (17,992)	0.277 (0.089)
1985	8,386 (2,633)	0.281 (0.088)	14,315 (4,495)	0.290 (0.091)	53,603 (16,830)	0.281 (0.088)
1981-85 Avg.	6,451 (2,143)	0.287 (0.095)	12,581 (4,211)	0.285 (0.095)	52,111 (17,525)	0.268 (0.090)

Table 2. (Continued).

Year	Louisiana		Gulf Region		United States	
	Value	Price	Value	Price	Value	Price
	($1,000's)	Doll./lb.	($1,000's)	Doll./lb.	($1,000's)	Doll./lb.
1986	9,310 (2,835)	0.289 (0.088)	16,701 (5,086)	0.301 (0.092)	58,005 (17,663)	0.314 (0.096)
1987[a]	16,958 (4,982)	0.381 (0.112)	29,600 (8,696)	0.393 (0.115)	70,776 (20,792)	0.358 (0.105)

Sources: Data for 1971-77 compiled from Fishery Statistics of the United States (various issues). Data for 1978-87 compiled from Fisheries of the United States (various issues), unpublished data provided by the National Marine Fisheries Service, and Vondruska (1986).

[a]1987 data are preliminary.

This is because commercial blue crab dockside prices in Louisiana, though generally slightly higher than the national average, tend to closely follow relative changes in regional and national prices (Table 2).

Historical Processing Activities

Estimates of blue crab processing activities in Louisiana, the Gulf region, and the United States are given in Table 3. These activities are measured only in terms of value, not poundage. Because the proportions of different processed products--cooked meat, cakes and patties, and stuffed crab--have changed over time, poundage estimates may have little meaning.

As indicated in Table 3, blue crab processing activities in Louisiana have increased when evaluated in either current or deflated terms. With an average annual deflated value of $1.6 million during 1971-75, the Louisiana blue crab processing sector increased its production to $2.6 million during the 1976-80, and $2.9 million during the 1981-85 period.

Evaluating sales of Louisiana's processed crab products only on a five-year basis, however, conceals some valuable information. When examined on a yearly basis, the 1971-77 and 1983-86 periods can be characterized by increasing blue crab processing activities, while 1978-82 can be viewed as a period of declining processing activities. The increase in processing activities during the 1983-86 period can be traced to a concurrent increase in state blue crab landings (see Table 1). Similarly, the growth in processing activities during the 1971-77 period, especially during the first few years, can be related to an increase in state landings. The precipitous decline in processing activities during the 1978-82 period does not, however, appear to reflect a decline in state landings. The decline in processing activities during this period may, however, be related to an outbreak of cholera in southwestern Louisiana in 1978. This outbreak was subsequently traced to the consumption of insufficiently home cooked crabs (see Blake et al. 1980 for details). This factor may have dampened demand for Louisiana-processed crab meat, which in turn prompted increased out-of-state shipments of live crabs. These shipments were then probably processed in other states. The Louisiana blue crab processing sector took several years to reestablish itself after this incident, as evidenced by the fact that the deflated 1977 value of processing activities ($3.5 million) was not approached again until 1984 ($3.4 million). The 1986 value of Louisiana processed blue crab was almost twice that observed for 1985, indicating rapid development in this sector probably resulting from a decline in alternative coastal economic activities.

Although between 40 and 50 percent of the Gulf region blue crab production is from Louisiana (Table 1), processing activity in the state typically represents less than a quarter of that for the Gulf region (Table 3). During 1981-85, for example, blue crab processing activity in the state averaged only 21 percent of the Gulf region total, this being slightly above the 18 percent share reported during 1971-75. Likewise, though Louisiana's commercial blue crab harvest represented 11.6 percent of the nation's total during 1971-75, blue crab processing activity represented just 6.5 percent of the nation's total. This share does, however, represent an increase over the 4.2 percent share reported during the 1971-75 period. With the large increase in Louisiana's blue crab processing activities in 1986, however, its share of the Gulf region and national blue crab processing activities increased significantly.

While the Gulf region has witnessed considerable growth in the number of firms or establishments, processing blue crabs during the 1970-85 period, Louisiana has not shared

Table 3. Value of Processed Blue Crab Products for Louisiana, the Gulf Region, and the United States, 1971-86.

	Louisiana		Gulf Region		United States	
	Current	Deflated[a]	Current	Deflated	Current	Deflated
1971	872	719	7,809	6,438	39,661	32,697
1972	1,200	958	9,189	7,336	45,431	36,258
1973	1,873	1,407	13,854	10,409	56,755	42,641
1974	3,580	2,424	13,699	9,275	59,654	40,389
1975	3,917	2,430	17,499	10,855	58,231	36,123
1971-75 avg.	2,288	1,588	12,410	8,863	51,946	37,622
1976	5,350	3,138	22,581	13,244	66,398	38,943
1977	6,505	3,584	24,529	13,515	68,576	37,783
1978	5,461	2,796	23,391	11,977	72,970	37,363
1979	3,378	1,554	25,979	11,950	84,667	38,945
1980	5,245	2,125	28,532	11,561	87,424	35,423
1976-80 avg.	5,188	2,639	25,002	12,449	76,007	37,691
1981	6,673	2,450	28,901	10,610	101,562	37,284
1982	6,307	2,182	30,525	10,559	103,618	35,842
1983	8,882	2,977	41,385	13,869	146,812	49,200
1984[b]	10,697	3,438	55,296	17,774	161,138	51,796
1985	11,759	3,692	50,865	15,970	162,374	50,981
1981-85 avg.	8,864	2,948	41,394	13,756	135,101	45,021
1986	21,313	6,490	60,455	18,409	164,905	50,215

Source: Compiled from unpublished data provided by National Marine Fisheries Service and Processed Fishery Products, Annual Summary (various issues). The 1986 values are preliminary and have been compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division.

[a]The deflated values of processed blue crab products were derived by dividing the current processed blue crab values by the Consumer Price Index (1967 = 1.00).

[b]The 1984 and 1985 values for the Gulf region and the United States reported here are somewhat less than those provided in Processed Fishery Products, Annual Summary. The difference reflects errors in the data base from which published statistics are derived.

in this growth for the most part (Table 4). During 1971-75, for example, Louisiana averaged about 26 establishments processing blue crabs compared with 78 at the Gulf region level. By 1976-80, the yearly number of Gulf region establishments had increased to 82 while the number of Louisiana establishments remained constant at 26. While the number of Gulf-wide blue crab processing establishments increased to an average of 92 during 1981-85, the number in Louisiana declined to about 23. A large increase in Louisiana blue crab processing establishments was observed, however, in 1986.

Viewing establishment numbers only on a five-year basis conceals some of the relevant information contained in Table 4. Most relevant, perhaps, is that the number of blue crab processors in Louisiana fell sharply in 1979, perhaps because of the cholera outbreak previously discussed, and again in 1984. Though the reason for this later decline is difficult to determine, it may be related to the rapid expansion in the state's crawfish production around this time. Because many Louisiana seafood processors have traditionally handled both crawfish and blue crabs, with crawfish processing constituting the primary activity, some firms may have turned exclusively to crawfish in their processing activities in response in increased crawfish production.

Yearly estimates of processed blue crab sales per establishment are also presented in Table 4. As indicated, blue crab processing revenues (sales) per establishment in Louisiana increased consistently during the 1971-77 period. In 1978, however, per establishment blue crab processing revenues declined significantly, possibly the result of a decline in demand for Louisiana processed crabmeat. Deflated establishment processing revenues in 1979 were, in fact, only about one-half those in 1977 while the number of blue crab processing establishments in Louisiana also declined. Deflated processed blue crab sales per establishment in Louisiana remained below those observed in 1977 until 1984.

A large increase in sales per establishment was, however, observed in 1984. This increase probably reflects three factors. First, 1984 blue crab landings increased about ten million pounds over those of the previous year (see Table 1), which would provide processing companies with additional raw product supplies. Second, there was a decline in the number of blue crab processing firms in 1984 which, when taken in conjunction with increased landings, meant an even greater raw product supply per company. Finally, several of the Louisiana blue crab processing establishments operating in 1983 were not operating in 1984. These processing companies, as previously hypothesized, may have been primarily crawfish-oriented with blue crab processing activities undertaken only during periods of low crawfish supply. Thus, it is likely that these firms had fewer blue crab processing activities than the industry as a whole. Cessation of blue crab processing activities by these firms would, hence, increase average blue crab processing revenues among remaining firms. Keithly et al. (1988) have, in fact, shown that Gulf region blue crab processing firms ceasing crab processing operations have traditionally been smaller than the industry average.

Sales of processed blue crab meat by Louisiana firms have traditionally been less than the Gulf region average (Table 4). During the 1976-80 period, for example, processed blue crab sales by Louisiana companies averaged about $200,000 annually compared with around $300,000 for the Gulf region. The observed difference in annual blue crab sales among Louisiana and Gulf region establishments has, however, been narrowing through time and in 1986, processed blue crab sales by Louisiana companies, for the first time, exceeded the Gulf region average.

Establishment turnover, or entry and exit, in the Louisiana and Gulf region blue crab processing sectors can result from three factors. First, established processing firms can add blue crabs to their product lines, i.e., an entry, or remove blue crabs from their

Table 4. Louisiana and Gulf Region Numbers of Blue Crab Processing Establishments and Blue Crab Sales Per Establishment, 1971-86.

	Louisiana			Gulf Region		
	No. of estab.	Sales Per Estab.		No. of estab.	Sales Per Estab.[b]	
		Current	Deflated[a]		Current	Deflated
		------ $1,000 ------			------ $1,000 ------	
1971	22	39.6	32.7	64	131.7	108.6
1972	26	46.2	36.8	75	137.5	109.7
1973	30	62.4	46.9	85	198.7	149.3
1974	28	127.9	86.6	86	204.9	138.7
1975	25	156.7	97.2	82	222.3	137.9
1971-75 avg.	26.2	87.3	60.6	78.4	179.0	128.8
1976	29	184.5	108.2	91	252.1	147.8
1977	27	240.9	132.7	85	293.8	161.9
1978	29	188.3	96.4	84	285.6	146.2
1979	23	146.9	67.6	75	329.4	151.5
1980	23	228.0	92.4	77	371.6	150.6
1976-80 avg.	26.2	198.0	100.7	82.4	306.5	151.6
1981	22	303.3	111.4	81	365.5	132.0
1982	26	242.6	83.9	88	354.4	122.6
1983	27	329.0	110.3	98	422.3	141.5
1984	20	534.9	171.9	97	570.1	183.2
1985	22	534.5	167.8	94	542.3	170.3
1981-85 avg.	23.4	378.8	126.0	91.6	449.7	149.9
1986	28	761.2	231.8	96	629.7	185.0

Source: Compiled from unpublished statistics provided by the National Marine Fisheries Service. The 1986 values are preliminary and were compiled from unpublished data provided by the National Marine Fisheries Service, Fisheries Statistics Division.

[a]The deflated sales per establishment were derived by dividing current sales per establishment by the Consumer Price Index (1967 = 1.00).

[b]Estimates of sales per establishment in the Gulf region reported here will tend to differ slightly from those the reader would obtain by dividing total Gulf region blue crab processed value (Table 2) by the number of establishments provided in this table. This discrepancy arises from the fact that there are minor differences between the published processed value data and the unpublished data given to the authors by the National Marine Fisheries Service.

processing lines, i.e., an exit. Second, establishments can change ownership, which results in both an exit (the previous owner) and an entrance (the new owner). Finally, an exit can result from a processor ceasing blue crab processing activities, while an entrance will result when a new blue crab processing facility begins operations. Turnover patterns in the Louisiana and Gulf region blue crab processing sectors are provided in Table 5.

As the information in Table 5 indicates, turnover in the Louisiana and Gulf region blue crab processing sectors is much larger than evident when just evaluating annual change in number of blue crab processing establishments. The rate of turnover in Louisiana, more than 100 percent over a five-year period, exceeds that found for the Gulf region where an 85.1 percent rate of entry and a 68.7 percent rate of exit were observed. The relatively large turnover rate among Louisiana blue crab processors may, to some extent, reflect large annual variations in crawfish supply and, hence, annual crawfish and blue crab processing activities by some processors. The relatively large entrance rate compared with the exit rate in the Gulf region has led to the large net increase in the number of Gulf region establishments processing blue crabs. Because the rate of entry among Louisiana blue crab establishments has been only slightly higher than the rate of exit, only moderate change in the number of Louisiana blue crab processors has been observed during the 1970-85 period.

Purchases, Processing, and Marketing

Little is known of the processing and marketing activities undertaken by primary Louisiana blue crab dealers. The authors, to document these activities for the 1986 calendar year, personally interviewed 33 Louisiana blue crab dealers (i.e., processors and primary wholesalers) in the spring of 1987. Companies to be interviewed were initially selected from a 1985 list of Louisiana blue crab dealers provided to the authors by the National Marine Fisheries Service (NMFS). Deviations from this list were, however, made for two reasons. First, the authors were made aware of newly established processing operations during the interview process and an attempt was, therefore, made to interview these recent entrants. The second reason for deviating from the list reflects the fact that the authors knew of some large blue crab wholesalers not included in the NMFS list and others on the NMFS list which could be considered secondary wholesalers. Since primary wholesalers were the target of the analysis, the authors interviewed some of these larger wholesalers and attempted to avoid interviewing secondary wholesalers. These factors, taken into consideration during the interview process, suggest that the wholesalers who were interviewed may be larger than the industry average. Four of the completed interviews were subsequently deleted from the analysis because of questionable or inconsistent information obtained during the interview process,[2] leaving 29 completed surveys.

In addition to the crab volume handled by Louisiana dealers, a considerable, though undocumented, number of crabs do not pass through Louisiana wholesaling and processing establishments but, rather, are picked up routinely at Louisiana's docks by out-of-state buyers (i.e., wholesalers and processors). These out-of-state buyers pick up the blue crabs on routine runs through Louisiana and truck them back to Alabama, Mississippi, and the panhandle of Florida where they are used in processing activities.

Because of this practice, interviewing only Louisiana dealers would not provide an accurate indication of the number, and hence percentage, of Louisiana crabs being processed out of state. To take this situation into account, the authors conducted telephone interviews with many of the larger blue crab processing firms in Alabama, Mississippi, and the panhandle of Florida who were thought to utilize Louisiana crabs in their processing

Table 5. Total Number and Entry and Exit Patterns Among Louisiana and Gulf of Mexico Shellfish Processing Establishments,[a,b] 1970-85.

	Louisiana			Gulf Region		
	Total	Entry	Exit	Total	Entry	Exit
	No. of Estab.					
1970	18			56		
1971-75		21	14		59	33
1975	25			82		
1976-80		25	27		60	65
1980	23			77		
1981-85		28	29		78	61
1985	22			94		
Total		74	70		197	159
Average[c]	22	24.7	23.3	77.2	65.7	53
Rate of change[d](%)		112.3	105.9		85.1	68.7

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

[a]An establishment, or plant according to National Marine Fisheries terminology, is a single processing entity. It is possible that two or more establishments may be under sole ownership of a company. To be considered a processing establishment, as opposed to wholesaling establishment, some physical change of the product must be made. This can range from the picking and cooking of crab meat to breading, stuffing, and the cleaning and polishing of shells.

[b]Establishments that exited and subsequently reentered are included as an exit and an entrance in the analysis.

[c]The average is based on a five-year period.

[d]The rate of change is calculated by dividing average entry or exit by the average total number of establishments and represents that occurring over a five-year period.

activities.[3] These interviews were conducted to assess the volume and value of Louisiana crabs used in their processing activities. An estimate of Louisiana crabs not handled by Louisiana dealers but used in out-of-state processing activities was then made by subtracting the reported out-of-state shipments of crabs for processing by interviewed Louisiana dealers from reported use of Louisiana crabs by out-of-state processors (i.e., obtained from telephone interviews with out-of-state crab processors). This estimate will be discussed in more detail in a later section of this report.

Louisiana Blue Crab Procurement

Procurement of Louisiana blue crabs is made by Louisiana wholesalers, Louisiana processors, and out-of-state buyers who circumvent traditional Louisiana marketing channels by purchasing crabs directly from groups of crabbers.

Wholesaler procurement. Louisiana crab dealers that do no processing of crabs are considered wholesalers and tend, overwhelmingly, to purchase their crabs directly from local crabbers. The primary wholesalers are established along the local bayous in the crab producing regions of the state which allows the crabbers to bring their daily catches directly to the dock of the wholesaler to whom they are selling. All nine primary wholesalers interviewed for purposes of this analysis indicated using this method of procurement exclusively. Many secondary wholesalers are located in metropolitan regions of the state and procure crabs through other methods.

A total of 14.3 million pounds of crab, valued at $4.71 million, was purchased in 1986 by the nine interviewed primary wholesalers at an average price of $0.329 per pound. On a pre-establishment basis, interviewed wholesalers each handled, on average, about 1.59 million pounds of crab valued at $523 thousand. Since the interviews concentrated on larger and nonsecondary wholesalers, the per-establishment figures discussed above may be slightly larger than those of average Louisiana blue crab wholesalers and should, therefore, be viewed as such in the analysis. It is thought, however, that the interview process did account for a large proportion of the total volume of blue crab wholesaling activities.

Processor procurement. Louisiana blue crab processors often require very large crab supplies, which necessitates transportation from several locations. Processors may, therefore, not be linked to a bayou or waterfront site, but may be situated inland and out of local crab producing regions.[4] As a result, they use a number of different methods to procure their blue crabs. The most common method of procurement among processors, according to the survey results, is the same as that used by wholesalers, i.e., crabbers bring their daily catches to the processor's facility, unload, and sell directly to the processor. Fourteen of the 20 interviewed processors purchased 10.33 million pounds of crabs valued at $3.24 million ($0.31 per pound) during 1986 using this method of procurement. Nine of these 14 processors used this method exclusively in securing their raw materials.

Two processors made routine trucking routes to procure their blue crabs, purchasing 5.73 million pounds of crabs in this manner. The crabs, valued at $1.80 million, were purchased at an average price of $0.31 per pound. One of these two processors also secured additional raw materials via other methods.

Seven processors had crabs trucked to their plants by independent truckers or crabbers. Almost seven million (6.84 million) pounds of crabs, valued at $2.17 million ($0.32 per pound) were delivered, over a radius of up to 80 miles. Three of these seven processors used only this method of procurement.

Finally, two of the interviewed processors purchased live blue crabs directly from other Louisiana crab dealers (i.e., wholesalers and other processors) in 1986. These two processors purchased 5.15 million pounds of crabs valued at $2.00 million ($0.389 per pound). Both these processors used other methods of procurement in addition to purchasing live crabs from other dealers.

Out-of-state procurement. A sizeable number of Louisiana crabs leave the state without entering formal Louisiana marketing channels because of direct purchases at docks by out-of-state buyers. These crabs are subsequently processed in Alabama, Mississippi, and the Florida panhandle. The authors estimated that 6.64 million pounds of Louisiana crabs ($2.08 million) used in other states' processing lines did not first enter the Louisiana seafood marketing channel. These numbers, however, should be considered only "ball park" estimates of the true volume and value of direct purchases by out-of-state buyers. One Louisiana wholesaler thought to be relatively large refused to cooperate with the survey. Furthermore, some of the smaller wholesalers were not interviewed. To the extent that these wholesalers sold crabs out of state, the estimate of direct purchases of Louisiana crabs by out-of-state buyers will be overstated. Conversely, some out-of-state processors who use Louisiana crabs in their activities may not have been contacted, which would tend to underestimate out-of-state shipments.

Utilization, Market Outlets, and Distribution

Louisiana crabs are sold by wholesalers and processors in either live or processed form. Wholesalers sell live crabs. On occasions when there is an oversupply of crabs relative to processing capabilities, or an excess inventory of processed crab meat, processors also sell live crabs. Utilization and marketing of Louisiana crabs are examined in this section of the paper. The discussion will follow the overview of the marketing channels for Louisiana blue crabs, diagrams for which are provided in Figure 1 (volume) and Figure 2 (value).

Live blue crab marketing. When sold live, crabs can be marketed either graded or ungraded. Crabs sold graded on the basis of size and sex are primarily used in restaurant and retail seafood market outlets. Ungraded crabs are generally purchased by processing companies for cooking and picking to remove the meat.

An overview of the initial sales of live crabs by Louisiana wholesalers and processors is provided in Figure 3 (this figure is derived from Figures 1 and 2). One-and-one-half million pounds (10.4 percent) of the 14.3 million pounds of crabs that interviewed wholesalers had for sale in 1986 were used in Louisiana crab processing activities. The remainder, 12.8 million pounds (89.6 percent), was used in other activities.

Interviewed Louisiana processors, though purchasing an estimated 1.5 million pounds of crab from Louisiana wholesalers during 1986, also sold 2.79 million pounds of live crab (these sales do not include internal transactions among processors shown in Figure 3). An estimate of live blue crabs available for sale by Louisiana dealers, 15.59 million pounds valued at $6.49 million, is obtained by adding Louisiana wholesaler supply net sales to Louisiana processors (12.8 million pounds; $5.35 million) to live crab sales by Louisiana processors (2.79 million pounds; $1.14 million).

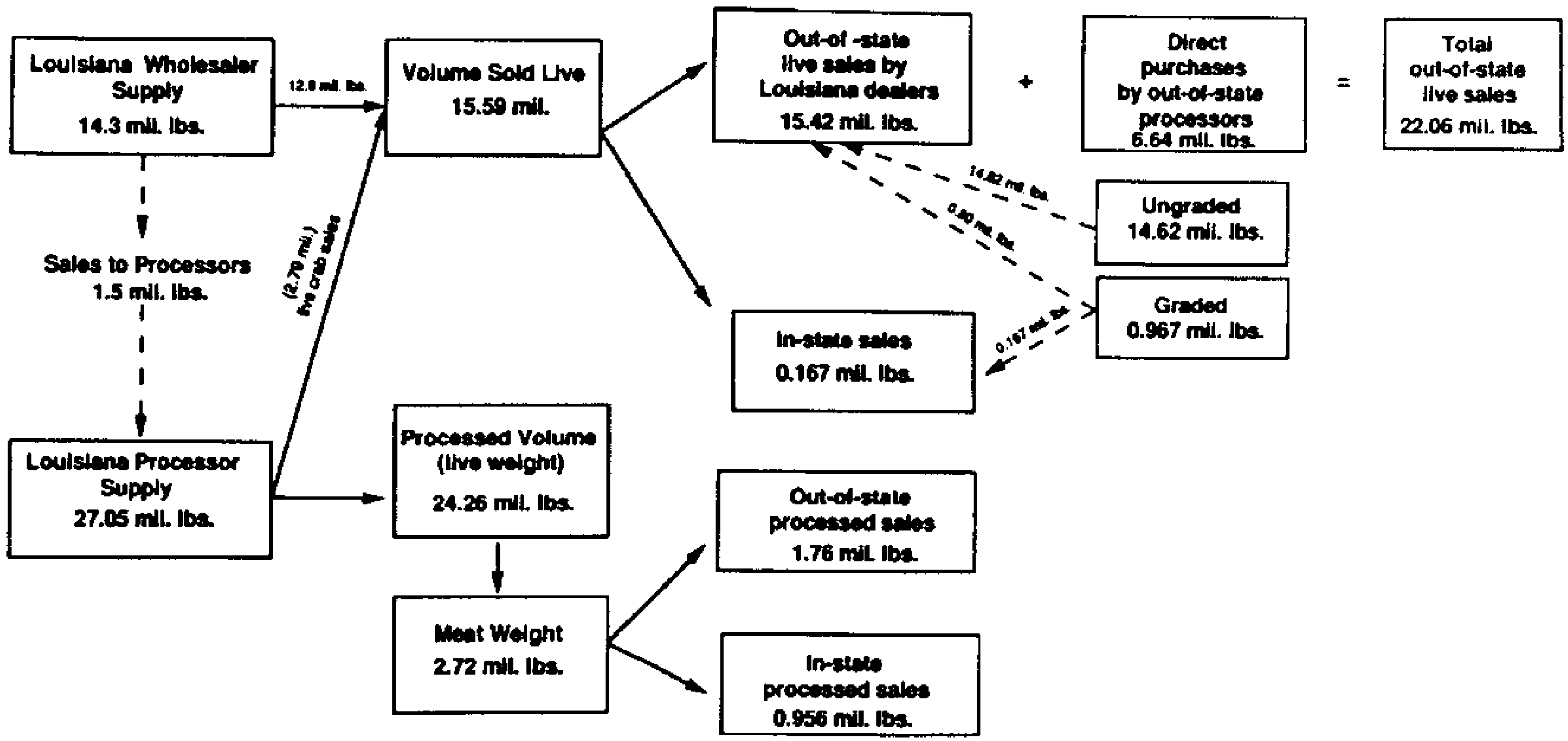

Figure 1 - Flow Diagram of Louisiana Blue Crab Sales (Volume), 1986

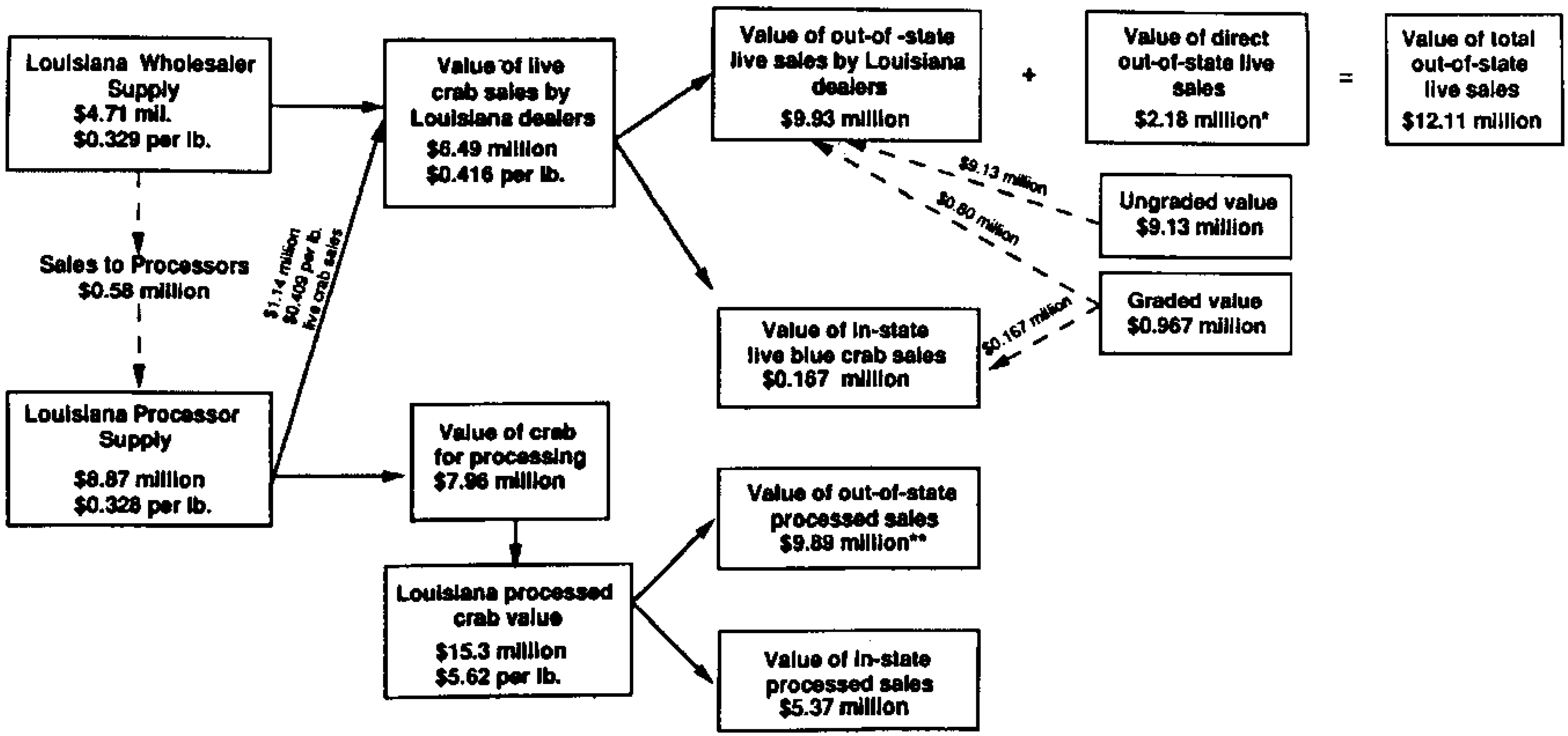

Figure 2 - Flow Diagram of Louisiana Blue Crab Sales (Value), 1986

*The average price per pound of direct out-of-state live blue crab sales has been assumed to equal the price paid by Louisiana wholesalers.
**It has been assumed that volume of crab meat sent out of state sold at the same price as in-state.

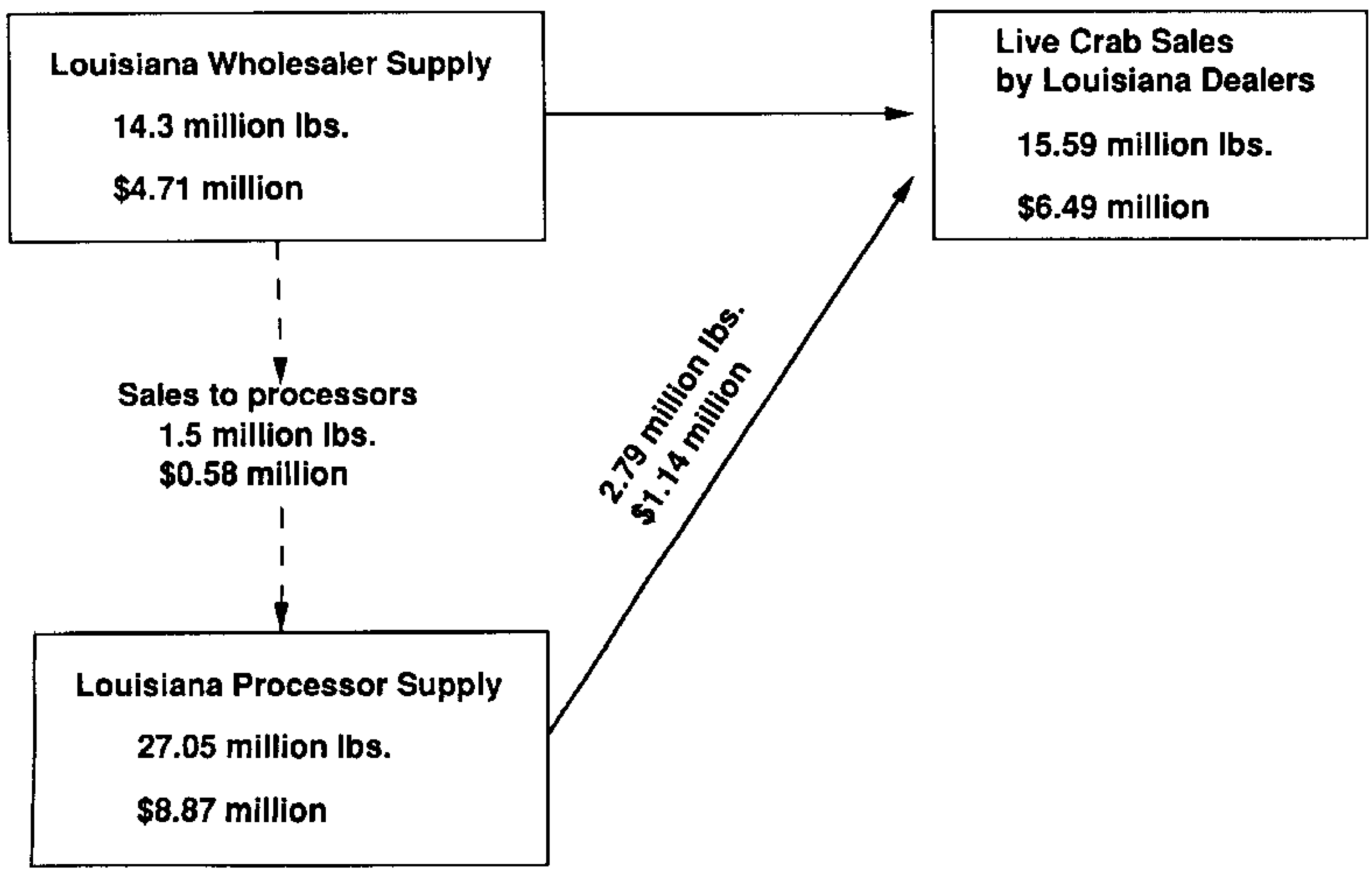

Figure 3 - Flow Diagram of Louisiana Dealer Initial Blue Crab Sales, 1986

Virtually all live crab sales by Louisiana crab dealers (i.e., primary wholesalers and processors) are sold ungraded and to out-of-state buyers, (Figure 4). Interview results indicate that of the 15.59 million pounds of blue crabs available for sale by Louisiana dealers, 15.42 million pounds (98.9 percent) were sold to out-of-state buyers at an average per pound price of $0.41. The out-of-state live marketings of 15.42 million pounds were sold mostly ungraded (14.62 million pounds) while the in-state marketings of 0.167 million pounds were all graded and sold for $1.00 per pound.[5]

In addition to the marketing of live blue crabs by Louisiana dealers, considerable direct purchases are made by out-of-state buyers who, if not processors themselves, sell the crabs to out-of-state processors. Adding these direct purchases by out-of-state buyers (estimated previously at 6.64 million pounds) to out-of-state sales by Louisiana dealers (15.42 million pounds) yields total out-of-state live crab shipments of 22.06 million pounds (Figure 4).

The initial distribution of the total out-of-state live crab sales was concentrated heavily in one section of the country. Approximately 94 percent (93.7 percent) of out-of-state poundage was sold in the southeast (Figure 5). This region, defined as the coastal states from Mississippi through North Carolina, received 20.66 million pounds of live Louisiana crabs.[6] Fewer than 1.5 million pounds (5.5 percent) of Louisiana live blue crabs were sold in the northeast and mid-Atlantic regions (defined as the coastal states of Virginia through Maine), while the remaining 0.8 percent of live crab sales were evenly distributed between the western region of the country and Texas. No first sales of live crab were reported in the midwestern region of the country. An unknown quantity may, however, eventually find its way to the midwestern region as it passes through secondary and tertiary dealers.

Use of Louisiana live crabs by in-state and out-of-state receivers was also estimated based on results of the survey. All of the reported live crabs sold in-state, 167,000 pounds, were directed to retail outlets for final sale to the consumer. Of the 22.06 million pounds of live Louisiana crabs sold out-of-state, about 99 percent was directed to processing companies. These processors then benefit from Louisiana crabs through value-added processing. The small number of out-of-state sales not directed to processing lines, about one percent of the total, was graded and sent to out-of-state retailers and restaurants.

<u>Processed crab marketing</u>. Interviewed Louisiana crab processors purchased an estimated 28.05 million pounds of crabs during 1986 (Figure 6). One million pounds of this supply represented transfers between processors for a net purchase of 27.05 million pounds. Of this, 2.79 million pounds were subsequently resold live. Hence, the 20 interviewed processors used a total of 24.26 million pounds of live crabs in their 1986 processing lines, or about 1.21 million pounds per processing establishment. Because all processors were not interviewed (i.e., 20 of the 28 blue crab processing establishments reported by NMFS), the actual volume of Louisiana live crabs used for in-state processing activities exceeds that reported here.

Total employment among the twenty interviewed processors was 944 persons, 160 of whom were full-time and 784 of whom were seasonal. Each firm employed approximately 50 persons, though the average varied considerably depending upon the company's size. Some employees (especially full-time) were used in more than one processing activity.

Louisiana blue crabs are cooked for processing by boiling, steam boiling, or steaming. Once the crabs are processed, the meat is picked, refrigerated, and sold in a variety of containers. The most common processing technique used by Louisiana processors is boiling. Of the Louisiana blue crab processors interviewed, 59 percent boiled the product before picking. The steaming technique was used by 35 percent of the processors. Steam

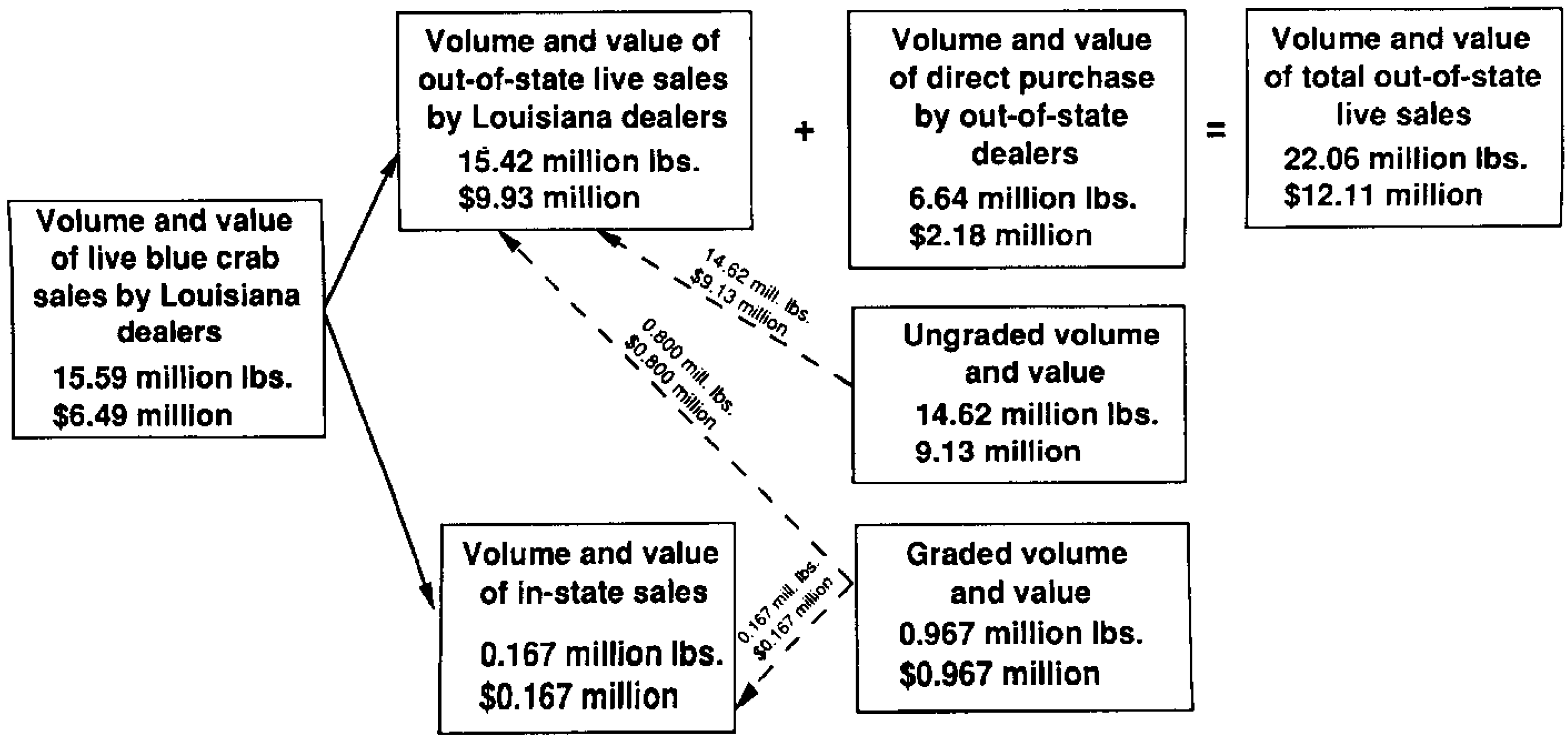

Figure 4 - Flow Diagram of Live Blue Crab Sales, 1986

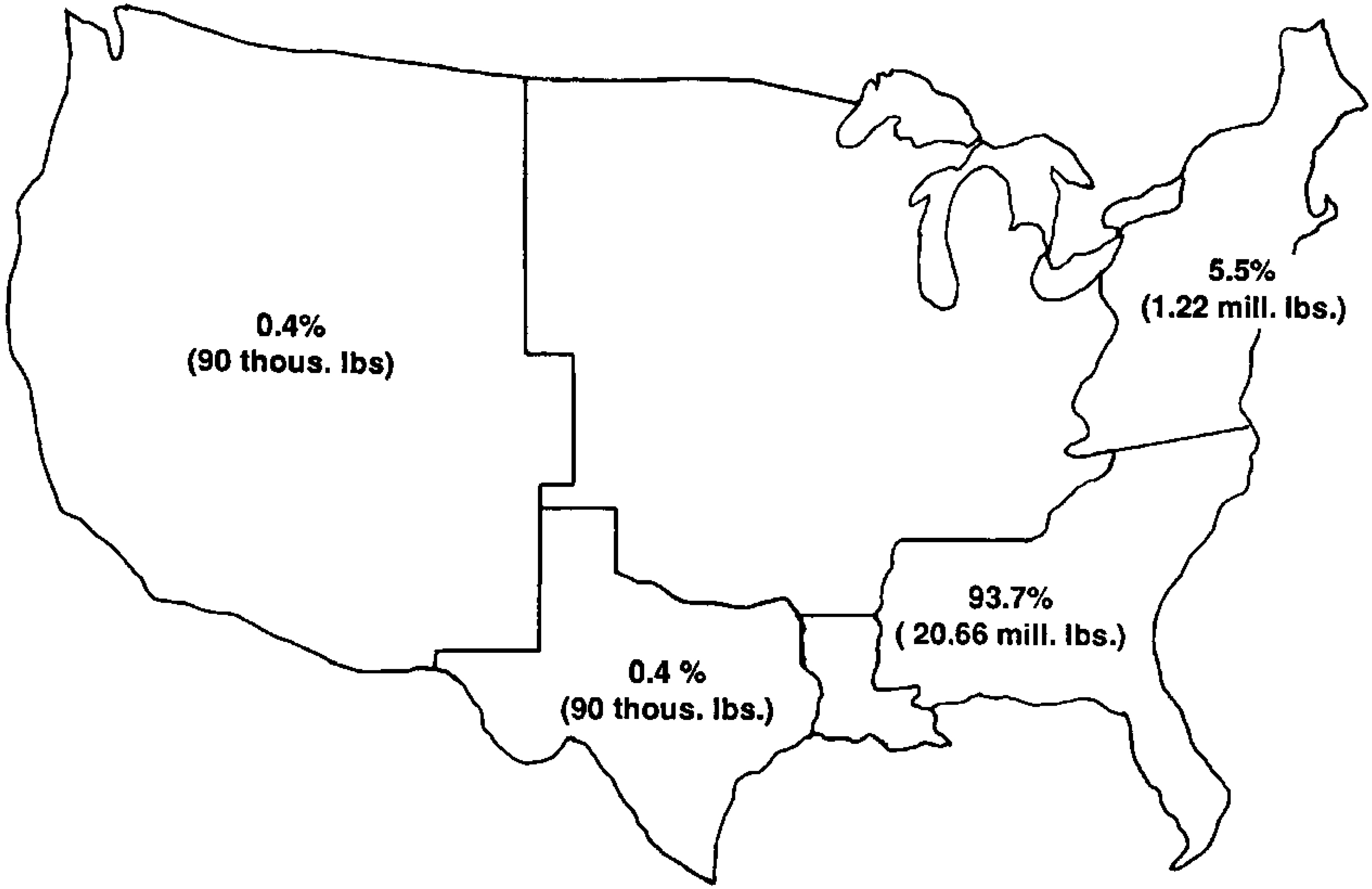

Figure 5. Distribution of live Louisiana blue crab sales out of state.

boiling was not commonly used by processors.[7] Hand picking crabs was the method used by all interviewed processors. Though picking rates varied considerably among workers, from 20 to 60 pounds of meat per day, the industry average stood at 40 pounds of meat per picker per eight hours. Mechanical picking is seldom used in Louisiana, although use of mechanical methods may, in the future, gain some acceptance as a means to handle brief instances of excess supply.

Louisiana-processed crab meat, as indicated by interviewed processors, was marketed in three forms: fresh, frozen, and pasteurized. The vast majority of Louisiana crab meat production, 87.8 percent, was marketed fresh, while another 7.6 percent was marketed frozen. Only 4.6 percent of crab meat production was pasteurized in 1986. Pasteurization was in use on a seasonal basis to facilitate storage and sale in the off-season.

Container sizes used to market blue crab meat varied greatly among processors. All interviewed processors used the one-pound container for most of their production. Besides the one-pound containers, several (31 percent) of the processors also used 12-ounce cups; eight-ounce containers were also used, though infrequently. Similarly, though mention was made of two-pound bags and five-pound vacuum containers, their use was minimal among the interviewed processors.

From 24.26 million pounds of live crabs, processors produced 2.72 million pounds of meat.[8] The average reported live weight-to-meat weight conversion yield was 11.2 percent[9] (Figure 6). The picked meat, valued at $15.28 million, sold at an average price of $5.62 per pound.

Of the 2.72 million pounds of meat produced by the 20 interviewed processing companies, the largest four of these companies, i.e., 20 percent, accounted for 52 percent of production by weight. The largest ten of these companies accounted for about 85 percent of the processed crab meat by volume. Though these numbers do suggest a certain degree of concentration in the Louisiana blue crab processing sector, this concentration does not suggest any price or raw input control. Since Louisiana's processors must compete with regional, south Atlantic, and national blue crab processors, it is doubtful that any Louisiana processors can act as price leaders. With respect to control of the raw product, the observed recent expansion in state landings and the out-of-state shipments of live crabs suggest adequate local supplies for all current processing needs. Prospective investors should, however, consider the recent and probably continuing expansion of the Louisiana blue crab processing sector when considering new investment. Competition for crab supplies will probably increase.

An estimate of processed blue crab sales per establishment, $764,000, was made by dividing total picked meat value, $15.28 million, by the number of interviewed processors, i.e., 20. This estimate compares very favorably with the $761,000 estimate obtained from National Marine Fisheries Service data for the 1986 calendar year (see Table 4).

Picking blue crabs yields several different product forms. The body of the crab, as outlined by the Southeastern Fisheries Association (1988), produces jumbo meat (i.e., the largest white pieces or chunks of crabmeat typically from the backfin), lump/backfin meat (i.e, large, white pieces of chunks or crabmeat which can include backfin), and special white meat (smaller, white pieces or chunks of crabmeat which usually exclude backfin). The claws of the crab produce claw meat, cocktail claws, and fingers. Responses by processors regarding the breakdown of total meat production into these different product forms are presented in Table 6.

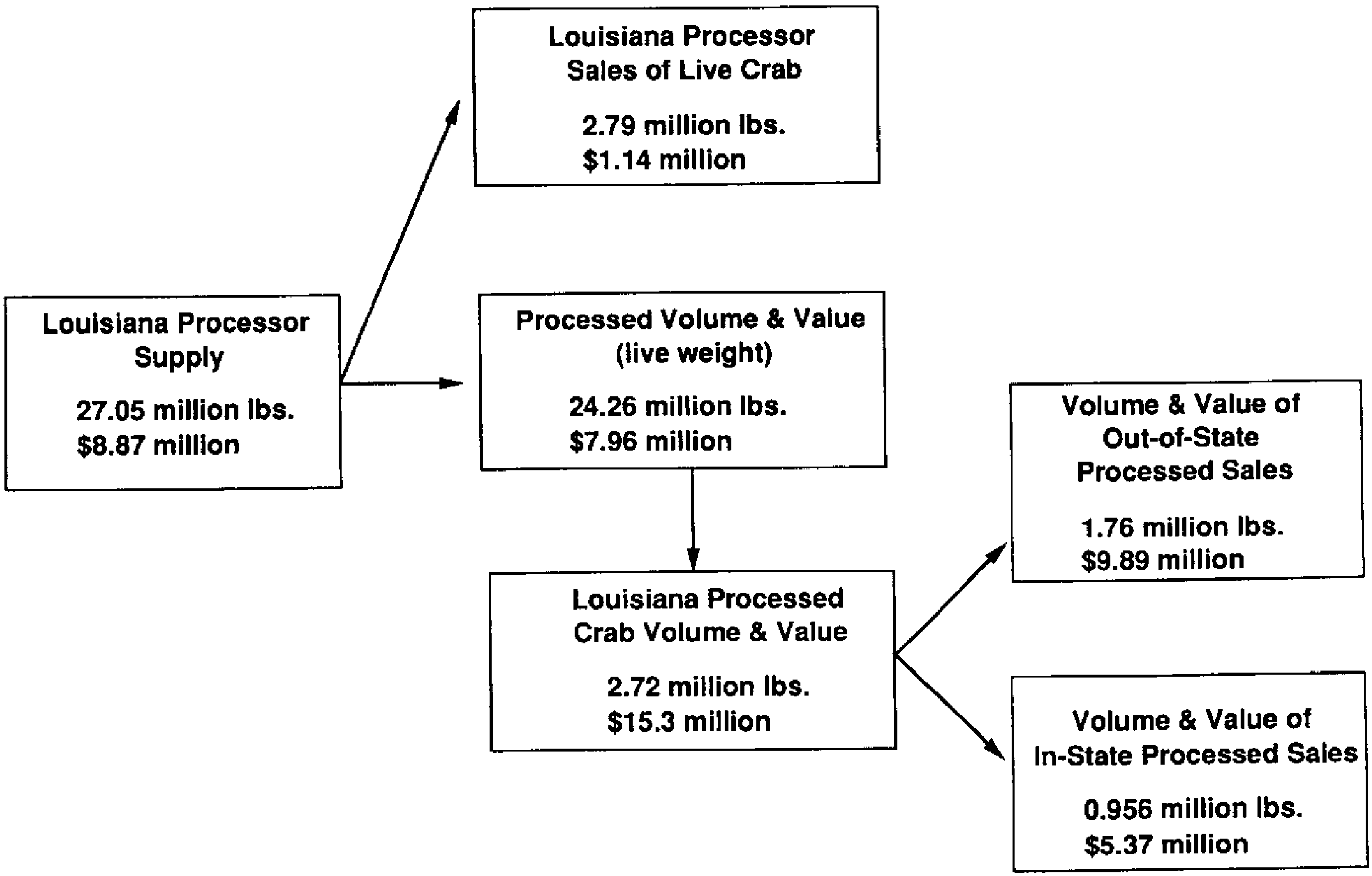

Figure 6 - Flow Diagram of Louisiana Blue Crab Processing Activities, 1986

Table 6. Louisiana Estimated Blue Crab Meat Production by Product Form: Relative Quantities, Values, and Prices, 1986.

Product form	Volume (pounds)	Percent[b,c] by volume	Value (dollars)	Percent by value	Dollars/ pound
Body Meat:					
Jumbo	373,140	15.4	3,106,405	22.6	8.33
Lump/Backfin	640,190	26.4	4,474,340	32.6	6.99
Special White	527,587	21.7	2,613,165	19.0	4.95
Total Body Meat	1,540,917	63.5	10,193,910	74.3	6.62
Claw Meat:					
Claw	550,610	22.7	2,170,225	15.8	3.94
Cocktail Claw	130,080	5.4	206,165	3.7	3.89
Fingers	205,370	8.5	848,387	6.2	4.13
Total Claw Meat	886,060	36.5	3,524,777	25.7	3.98
Not Specified[a]	290,907	-	1,559,260	-	5.36
TOTAL	2,717,884	-	15,277,948	-	5.62

[a]Some processors were unable to provide a breakdown of total meat production into specific product forms. Their total meat production was classified under "not specified".

[b]Percentage by volume and value is based on totals for body meat and claw meat categories and does not include the not-specified category.

[c]Summation of specific percentages may not equal 100 due to rounding error.

In terms of meat, slightly less than two-thirds of total production (63.5 percent) is derived from the body portion of the crab. The remaining 36.5 percent is derived from the claws. Though representing about two-thirds of meat production by volume, the body of the crab produces almost three-quarters of total meat value because of its relatively high per-pound price ($6.62) when compared with claw meat ($3.98).

Among specific product forms, production of jumbo meat represented about 15 percent of total production while lump/backfin meat contributed another 26 percent. These two product forms combined represented about 42 percent of total production by volume but over 55 percent by value due to their relatively high prices.

There was, overall, considerable variation among processors regarding the breakdown of meat production from the body of the crab into specific product forms and some processors could not provide the breakdown. This reflects the fact that there are no set standards for identifying the different product forms though Southeastern Fisheries Association (1988) has proposed a set of standards. This traditional lack of identification naturally leads to confusion among buyers and sellers regarding product specification and, hence, also leads to extreme variations in price associated with the different product forms. This variation was also evident when interviewing the processors.

At the other end of the spectrum, claw meat products command relatively low prices and, as indicated by the processors, are also the most difficult to market. For instance, 47 percent of interviewed processors reported some difficulties in marketing blue crab fingers. Similarly, 41 percent reported some difficulties in marketing crab claw meat. Only 23 percent of interviewed processors, by comparison, reported occasional problems in marketing special white meat while none of the interviewed processors reported problems in marketing lump/backfin meat or jumbo meat.

Louisiana-processed crab meat is marketed both locally and out of state (Figure 6). Responses from interviewed processors indicate that 65 percent, or 1.76 million pounds, of the total weight of crabs processed in Louisiana during 1986 was directed to out-of-state markets while the remaining 35 percent (956,000 pounds) was sold locally. These estimates are for the first buyers. An unknown quantity of the meat sold to in-state buyers is probably resold out-of-state. Thus, first sales do not necessarily indicate the precise area of consumption.

Many of the interviewed processors indicated receiving a higher price, up to two dollars per pound for jumbo meat marketed out-of-state. Because the large blue crab landings in the Chesapeake Bay region are not sufficient to provide all of the east coast needs where demand for seafood is high, the northeast and mid-Atlantic regions paid the higher prices for Louisiana blue crab meat. In response, the vast majority of the 1.76 million pounds of Louisiana processed crab meat was directed to the northeastern and mid-Atlantic markets. An estimated 1.23 million pounds, or 70 percent, of the 1.76 million pounds of out-of-state shipments were in fact directed to these regions (Figure 7). Another 15 percent of processed meat (263,000 pounds) was marketed in Texas. Only 8.5 percent (56,000 pounds) of out-of-state shipments was directed to the other southern states. The paucity of sales in this market probablyreflects competition by other processors in the region. The remaining out-of-state sales were directed to the midwest (4.4 percent, 77,400 pounds) and the west coast (2.3 percent, 41,800 pounds).

Overall, management in Louisiana crab processing companies expressed major problems marketing blue crab meat products in the midwest. Twenty-eight percent of interviewed processors expressed problems marketing processed crab meat in this region. Unfamiliarity with the blue crab in the region was the reason expressed for marketing

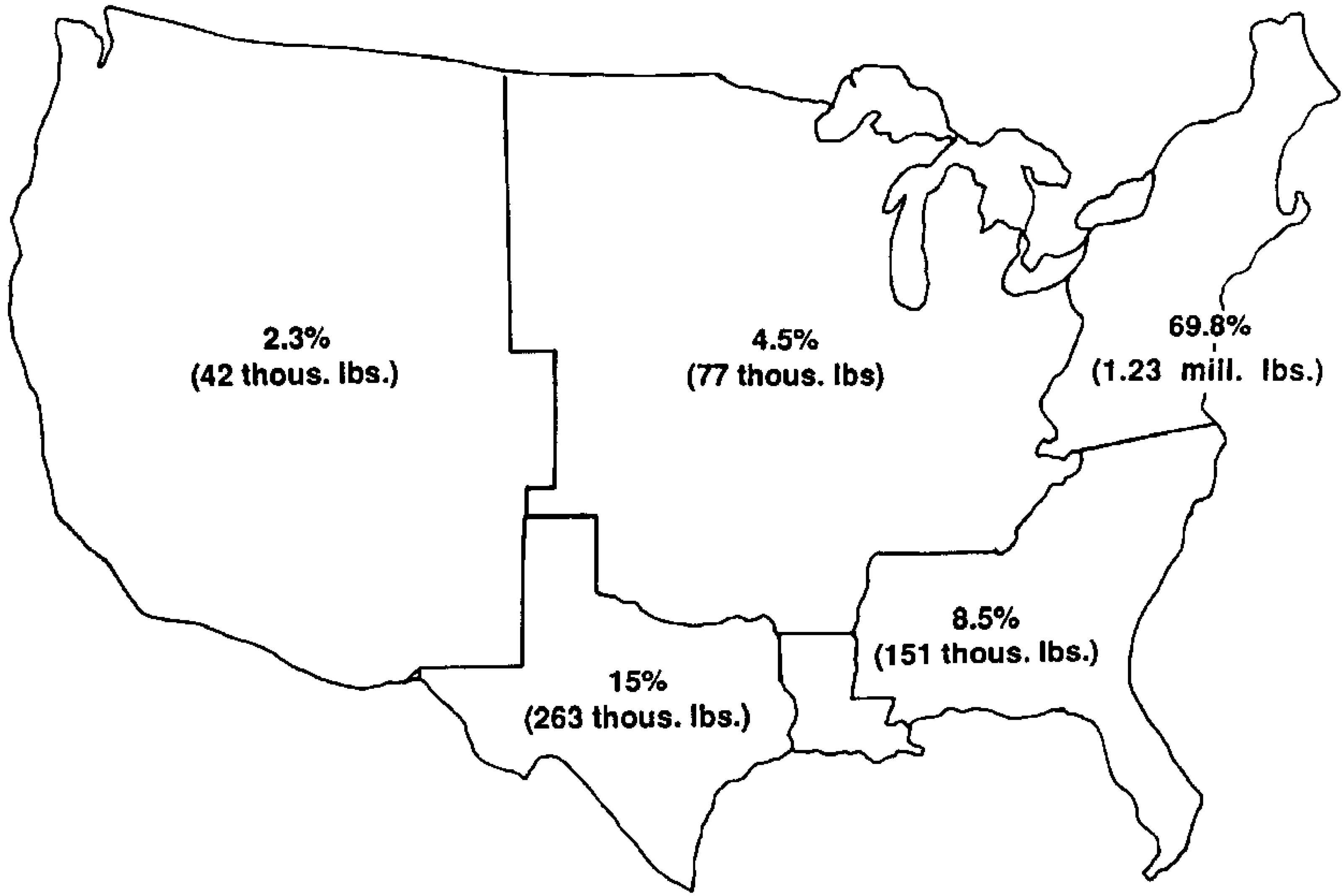

Figure 7. Distribution of processed Louisiana blue crab sales out of state.

difficulties. Some processors also mentioned that they avoided marketing blue crab products in Louisiana because of the relatively low prices received for the product locally. These low prices, some processors felt, are the direct result of unlicensed establishments which, because of fewer regulatory constraints, have lower overhead and labor costs. These lower costs, according to some processors, give unlicensed establishments a unfair advantage when selling processed blue crab meat locally.

The outlet used by Louisiana crab processors for marketing their products varies greatly depending upon whether the meat is sold in-state or out-of-state. For example, 81 percent of the meat sold out-of-state was bought by wholesalers while only 44 percent of the meat sold in-state was purchased by wholesalers. Only 19 percent of the crab meat sold out-of-state, conversely, was directed to retail or institutional outlets while 56 percent of the crab meat sold in state was directed to such outlets.

Discussion

The Louisiana live crab and processed crab meat marketing analysis brings up a number of issues worth discussing in greater detail. Survey results, for instance, suggest that while Louisiana processed crab meat is marketed both in-state and out-of-state, sales of live crabs by Louisiana dealers are directed almost exclusively to out-of-state markets. Since there is considerable restaurant and retail use of live crabs in Louisiana, the lack of in-state marketing of live crabs by Louisiana wholesalers indicates that local restaurants and retail outlets are obtaining their live crabs from other sources, most likely direct purchases from crabbers. This practice was, in fact, found prevalent by Roberts and Thompson (1982) in their study of the New Orleans metropolitan area. Also, some of the smaller wholesalers who were not interviewed probably direct their sales to local restaurants and retail outlets.

Survey results of Louisiana blue crab marketing practices also demonstrated that a large proportion of Louisiana crabs leave the state for processing. While it is impossible to provide an exact estimate of this proportion, some reference to it can be made based on results of the survey and NMFS processing data. Dividing the estimated total of out-of-state shipments of live crab for processing (22 million pounds) by the total volume of live crabs accounted for in the survey, 46.5 million pounds, suggests that 46 percent of Louisiana crabs leaves the state for processing. Because at least eight processors (the difference between NMFS-reported blue crab processors and the 20 interviewed processors), many of the smaller wholesalers who may sell local, and direct sales by fishermen to local restaurants and retail outlets were not included in this estimate, it should probably be considered on the high side. It appears likely, however, that at least 35 percent of the volume of Louisiana blue crabs does leave the state for processing. No matter what the exact proportion, these out-of-state shipments represent a loss of job opportunities, industry revenues, and hence an additional tax base for the state of Louisiana. The state, with a logical program for development, can probably capture much of this lost processing activity and have readily available outlets, such as the northeast, for marketing the processed product. It is evident that in 1986 new crab processing businesses were started in response to the identified opportunity. Thus, additional blue crab processing plant start-ups should be viewed more conservatively.

A final issue worth considering in this section pertains to the volume of live crabs accounted for in the survey, 46.49 million pounds, relative to 1986 reported Louisiana commercial blue crab landings of 31.6 million pounds. (Several million pounds of crabs were not accounted for in the survey, as evident by the fact that only 20 processors were interviewed for the analysis compared with the 28 firms for which NMFS collected data in 1986.) Some of the discrepancy between reported state crab landings and "true" commercial landings can be attributed to the direct purchases of Louisiana crabs by out-of-state buyers. Also, some of the remaining difference represents wholesalers (and possibly processors) interviewed for purposes of this study who were not also represented in 1986 government statistical records. Results of the present survey, when taken in conjunction with survey results regarding direct marketing practices by Louisiana commercial crabbers (see Roberts and Thompson 1982), provide a strong indication that historical commercial crab supply is larger than evident from published sources. New crab processing businesses and those contemplating expansion thus have access to larger supplies than previously reported.

Characteristics and Practices Among Louisiana Crab Dealers

Characteristics and practices of Louisiana blue crab dealers can provide insight regarding (1) competitiveness within the industry and (2) prospects for growth. The aforementioned recent expansion and the apparent opportunity for further processing expansion brought about by out-of-state live crab shipments, suggest information needs are high. Several questions needed to address these issues were included in the survey conducted by the authors in the spring of 1987. Responses to these questions are discussed below.

Establishment Value

High capital costs can, of course, deter entrance into any industry. The Louisiana blue crab processing and wholesaling industry is no exception. To see whether capital costs may be a deterrent to growth in the Louisiana blue crab wholesaling and processing sector, the authors asked processors and wholesalers to provide an estimate of the current value of total investment in their blue crab processing and wholesaling operations. As expected, not everyone could provide an answer. Results, therefore, are based upon responses by thirteen processors and six wholesalers. One of the processors who did not respond to the question rented his processing operation and thus did not know its value.

Blue crab processing establishments require more land, equipment, and total capital investments than wholesale firms. Including equipment, building, trunks, and land, the average value of blue crab processing firms in Louisiana was placed at about $487,000, ranging from less than $100,000 to well over $1.0 million. Seventeen percent of these establishments occupied leased land while the remaining 83 percent were established on private property. The average size of processing firms was 5,600 square feet. Since many processors, as will be examined later, handle more than one species, these capital equipment costs can be spread over several processing activities.

Average value of Louisiana blue crab wholesaling establishments was placed at $191,000, less than half that of processing establishments. Much of the difference reflects, of course, different capital requirements. Some of the difference may also reflect, as will be discussed, a distinct difference in the average age of processing and wholesaling establishments.

Age of Establishment

The age of the crab firms can provide information pertaining to possible barriers to entry, stability, and prospects for growth in the industry. Recent industry entrance by many firms suggests, for instance, that there are relatively few barriers to entry and that industry growth is occurring. Also recent entrance often suggests a competitive industry since barriers to entry are generally negligible in such cases. Conversely, an industry in which there has been relativity little recent entrance by firms could indicate that there are barriers to entry (which could reduce the competitiveness within the industry) or an industry with little growth potential.

The Louisiana blue crab processing sector, much more than the wholesaling sector, has expanded (or at a minimum has more turnover of ownership) in recent years. For example, more than 50 percent of the processors interviewed indicated that they had started processing operations since 1982 compared with only 11 percent of the wholesalers. The relative "newness" of many of the processing firms tends to support, as discussed in the context of Tables 4 and 5, the large increase in processing firms in 1986 and the large degree of turnover in the Louisiana blue crab processing sector. Also, the recent entrance among processors probably reflects the apparent economic recovery of the processing industry which had declined around 1978, the apparent victim of a cholera outbreak traced to the consumption of improperly processed Louisiana crabs. Interview responses indicated that the average age of blue crab processing firms in Louisiana is 11 years while the average age of crab wholesaling establishments is 22 years. Since at least one processor who had been in other processing activities for several years only recently began processing blue crabs, the average age among the interviewed blue crab processing establishments tends to slightly exaggerate the number of years actually engaged in processing blue crabs.

The average age of Louisiana crab wholesaling establishments is rather surprising in light of the recent growth in the state's blue crab production (see Table 1). As mentioned earlier, however, the majority of live crabs handled by Louisiana processors is purchased directly from the crabbers rather than wholesalers. Therefore it is probable that much of the increased state production in recent years is being taken directly by processors without moving through wholesale channels. Also, whereas the Louisiana blue crab processing sector was apparently affected by a cholera outbreak, the wholesaling sector probably was not. In fact, wholesaling activities may have benefited from the demise in the processing sector during the late 1970s and early 1980s in that it gave wholesalers additional crab supplies traditionally destined for processing plants in the state.

Labeling and Advertising

Labeling and advertising practices can often provide an indication of an industry's competitiveness. In industries where a few firms dominate the market, for example, these few firms are often able to procure finished or nearly finished products from smaller firms in the industry and then use their own labels on these products. This type of arrangement is most common in those industries where a small group of firms has some type of advantage, either real or perceived, in the selling of the final product.

Similarly, advertising is used as a means to differentiate one company's product from the products of other companies in the industry. This differentiation can be either real or perceived. Company advertising is usually associated with those industries in which there is some lack of competition because it is in these industries where firms are able to differentiate their products on some real or perceived basis.

Survey results indicate that Louisiana crab processors do not generally process for someone else under another label but rather, for the most part, market the meat they process under their own label or brand name. Two of the 20 interviewed processors (10 percent) produced for someone else under another label. Only 2.6 percent of the total volume of meat accounted for in the interview process was produced as a custom label item.

Likewise, advertising was not a common practice among the interviewed processors, with only two of the processors using advertising during 1986 in an attempt to increase their sales. These two companies used seafood magazines as a medium to promote their products. Advertising Louisiana crab meat products is, however, likely to be used by Louisiana retailers who purchase from the processors.

Though advertising was not found to be in wide use among Louisiana crab processors as a means of differentiating their products, several processors indicated that they did attempt to differentiate their products through quality control. This quality control was generally presented in terms of a "fresher than average" product or a product with minimum shell fragments.

Brokers

Brokers were not commonly used by Louisiana crab processors, indicating that processors generally do not have major obstacles in finding markets for most of their products. Three of the 20 interviewed processors said that they used brokers to market their blue crab products,but no wholesalers used brokers. Reasons for not using brokers included lack of reliability and the added expenses incurred.

Terms of Sale

Terms of sale can provide an indication of customer loyalty and, hence, repeat sales. If buyers are content with the product, they may not look for new sources of supply. This can, theoretically, create a barrier to entry to new firms attempting to establish market outlets. Generally, a longer credit period infers a more established buyer-seller relationship.

Interview responses indicated that the terms of sale used by Louisiana blue crab processors and wholesalers range from cash on delivery (COD) to payment after 30 days. More than half (55 percent) of interviewed processors and wholesalers used COD terms in their business transactions.

Diversification

Louisiana blue crab wholesalers and processors do not rely exclusively on blue crabs to generate revenue. This helps to create stability in the industry by allowing firms to "fall back" on other products when crab prices or volumes are depressed.

Interviewed Louisiana crab wholesalers handled a number of different species in addition to blue crabs, including shrimp, oysters, and finfish. Yearly revenues among wholesalers associated with the handling of crab production also varied widely, from one to 100 percent, averaging 62.5 percent.

Interviewed processors relied on blue crabs for 73.7 percent of yearly revenues during 1986. More than half (68.7 percent) also handled crawfish. Alligator was also commonly processed, with about 19 percent of processors reporting having handled it during 1986.

Shrimp, finfish, frog legs, and oysters were also handled to a lesser extent by the interviewed processors.

Conclusion

The overall goal of this report was to provide an economic analysis of the Louisiana blue crab wholesaling, processing, and distribution network. To do so, the report first reviewed historical trends in the Louisiana harvesting and processing sectors and compared these trends with statistics at the Gulf region and national levels.

Louisiana blue crab landings, because of a decline in coastal Louisiana's economic activities, have increased significantly in recent years. The 1987 reported blue crab landings of 52 million pounds represent more than a 60 percent increase over the reported 31.6 million pounds the previous year an and almost 100 percent increase over the 22.5-million-pound 1976-80 yearly average. Because of the large increase in Louisiana's 1987 reported blue crab landings, the state accounted for more than 75 percent of the Gulf region blue crab production and about quarter of the national production in this year compared with historical averages of around 40-50 percent and 10-15 percent.

The Louisiana blue crab processing sector, though illustrating considerable long-run variation, has shown growth, especially in recent years. With a value of $21.3 million in 1986 for processed crab products, Louisiana almost doubled its 1985 value of $11.8 million. Overall, the 1971-77 and 1984-86 periods can be viewed as ones of expansion in the Louisiana blue crab processing sector while 1978-83 can be viewed as a period of contraction. This contraction, the authors suggest, resulted from an outbreak of cholera in southwestern Louisiana that was subsequently traced to the consumption of improperly processed Louisiana crab meat.

The large increase in the 1986 Louisiana value of processed blue crab has resulted from two factors. First, the number of blue crab processing establishments increased by more than 25 percent, from 22 in 1985 to 28 in 1986. Second, the value of processed crab per establishment increased from about $535,000 in 1985 to about $760,000 in 1986, or more than 40 percent. This increased blue crab processing activity resulted for the first time in Louisiana processors having greater blue crab sales than those observed for the Gulf region when evaluated on a per establishment.

Though Louisiana has traditionally harvested 40-50 percent of the Gulf region blue crab production and 10-15 percent of the national production, its processing activities have traditionally been less than what could be anticipated based on historical harvesting statistics. To examine why this is the case and whether changes could be made in an effort to generate increased state processing and, hence, increased income, employment, and an additional tax base, the authors personally contacted a large number of state blue crab dealers and out-of-state processors who utilize Louisiana blue crabs in their processing activities. The findings of this survey were substantial and should benefit the Louisiana blue crab industry by (a) providing established Louisiana dealers with a benchmark from which to compare their own practices, (b) providing lending institutions and potential investors with information to help them better assess the current status of the Louisiana blue crab industry and thus make more informed decisions, and (c) providing information to help industry and government efforts aimed at evaluating market legislation, management alternatives, and seafood promotion and marketing activities.

Results of the survey, for instance, indicate that a substantial quantity of the Louisiana commercial blue crab harvest, probably in the range of 35-45 percent, left the state to be processed in other southern states even though there was a large increase in the state's 1986 processing activities. Businesses contemplating expansion and potential entrepreneurs can use this information in making business decisions. The state, with a logical development plan, can assist these businesses in their ventures.

Results of the survey also indicate that about 65 percent of the Louisiana-processed blue crab meat was directed to out-of-state markets. The vast majority of these out-of-state shipments were, in fact, directed to northeast and mid-Atlantic markets in response to a relatively high price received for the product. Very little of the processed meat was initially destined for the midwestern and western markets, though a larger proportion than that indicated in the survey may end up in these markets as the crab meat passes through secondary and tertiary markets. These markets may wish to be considered for promotional activities as the Louisiana processing sector becomes further developed. If, of course, the northeastern and mid-Atlantic regions continue to purchase the majority of Louisiana's supply of crab meat at relatively high prices, there may be no immediate need to diversify distribution.

Characteristics and practices of Louisiana blue crab processing and wholesaling companies were also elicited during the interview process. Results suggest that processing firms are, in general, much newer than wholesaling firms, about 11 years of age compared with 22 years of age, and have more than twice the investment costs of wholesalers. Average investment costs among processors equalled $487,000 compared with $191,000 for wholesalers. Because processors were generally found to process more than one species, with almost 70 percent indicating the processing of crawfish, they can spread the relatively high investment costs among several different products.

Overall, the analysis suggests that much research pertaining to the Louisiana blue crab fishery is necessary. With the increasing harvest and utilization of Louisiana crabs, the question of whether the stock can continue to absorb the increased crabbing pressure needs to be addressed. This question, of course, relates to the amount of unreported catch, estimates of which are needed for management and development purposes. Finally, as this paper is being prepared, users of the Louisiana crabs are reporting increased competition for crab supplies, a tendency to smaller crabs, and increasing regulatory complications, and are calling for solutions. Sound solutions generally require additional research.

Footnotes

[1]Deflated values and prices referred to throughout this report were derived by dividing current values and prices by the Consumer Price Index (1967 = 1.00). Thus, they reflect those that would be expected given 1967 purchasing power.

[2]It was made known to the authors shortly after completion of the primary survey work that the Internal Revenue Service was contacting Louisiana blue crab processors to evaluate compliance with employment tax regulations. At least one firm that was interviewed but subsequently deleted from the analysis was under investigation at the time of the interview.

[3]Names of out-of-state processors that utilize Louisiana crabs were provided to the authors through area Sea Grant extension personnel and National Marine Fisheries Service personnel. These interviews were conducted to assess the volume and value of Louisiana crabs used in their processing activities.

[4]This can also be explained by product diversification within the Louisiana crab processing sector. As will be discussed in more detail in a later section of this report, many crab processors also handle crawfish and are sometimes situated in crawfish-producing regions of the state.

[5]The lack of in-state sales of live crabs indicates that there are considerable direct sales of blue crabs by fishermen to restaurants and retail seafood outlets.

[6]The distribution within this region was more concentrated than evident in Figure 7. Alabama blue crab processors received about 84 percent (17.2 million pounds) of the out-of-state live shipments to the region. Florida processors relied on much of the remaining out-of-state shipments.

[7]Among processors interviewed, 20 percent expressed interest in processing crab meat by steam cooking. Thirty percent of the processors expressed plans to pasteurize crab meat in the near future.

[8]The crab waste associated with picking activities was disposed of using three different methods. A third of the interviewed processors discarded waste in local bayous, a third disposed of residual waste in landfill dumps, and the remainder disposed of waste at waste management plants.

[9]This conversion figure is considerably less than the 14.5 percent listed by the National Marine Fisheries Service (NMFS) in some of its publications. Several factors can explain this discrepancy. First, the NMFS estimate pertains to a national average, whereas the estimate calculated by the authors pertains only to Louisiana. Second, it has been several years since NMFS updated many of its live-product-to-processed-meat conversion figures. Finally, the rapid expansion in the Louisiana harvesting sector suggests that a smaller crab may currently be taken than in previous years. Smaller crabs may yield a lower live-weight-to-processed-meat ratio. Firms contemplating expansion or potential investors should consider this factor.

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