Productivity and Profitability of South Carolina Shrimp Vessels, 1971-75

T M JONES, J W. HUBBARD, and K J. ROBERTS

Introduction

The commercial shrimp harvesting industry in the South Atlantic States is a fishery thought suitable for regional management within the concept of a state-federal partnership. A profile of the fishery cited stabilized landings, significant increases in license sales and sale of gear, poor prospects for dramatic increases in yields, and a paucity of information on the economic condition of the fishery as characteristics of the region's shrimp industry (Calder et al., 1974). Although the prospect of management to increase the biological yield of shrimp is not encouraging, managers may be able to devise strategies to increase net economic yield (Calder et al., 1974. The increased economic returns from improved management arise from the opportunity to decrease the cost of harvest (Gulland, 1974). While mature shrimp fisheries are not subject to stock overexploitation, excessive costs associated with overcapitalization are possible.

This paper presents a profitability and productivity analysis of the South Carolina shrimp fishery conducted in 1976 with the knowledge that operating units increased significantly in the 1950-71 period with no growth in average catch (Calder et al., 1974). Consequently, the productivity of conventional capital (i.e., nonlabor capital) and human capital (i.e., labor) were estimtated.

The 1971-75 period was selected as the basis for the study. The period includes one high and four aveage years of production. A wide range of ex-vessel prices and increased entry were evident. After a pilot study in the fall of 1975, the data were collected by personal interview in April 1976. Forty-five shrimp vessels were drawn from the population of 271 resident shrimp vessels licensed in 1974. Usable surveys were obtained from 41 vessels. The random sample was stratified on the basis of vessel length, with the dividing point at 55 feet. This classification was suitable due to the fact that engine size increased at that breaking point, and the choice was close to the average vessel size, 53 feet. There were 18 vessels in the 55-feet-and-under class and 23 vessels over 55 feet in length.

T M. Jones is with the Texas A & M University Extension Service, Weslaco, TX 78596. J W Hubbard is with the Department of Agricultural Economics and Rural Sociology, Clemson University, Clemson, SC 29631 K. J Roberts is an Associate Specialist, Marine Resource Economics, Knapp Hall, University Station, Baton Rouge, LA 70803.

ABSTRACT—This study uses data from a 45-vessel sample of South Carolina's double-rig resident shrimp trawlers to analyze resource productivity and profitability in the fishery from 1971 to 1975. Smaller vessels (<55 feet) were more profitable, and averaged 14 years older than the larger (>55 feet) vessels and had lower operating costs. Placing vessels of both size classes on the same risk and financing-cost basis would result in slightly higher percentage returns, i.e., lower losses, to investment in the larger trawlers than to investment in the smaller trawlers.

An opportunity-cost analysis indicated that shrimping labor is earning less than its opportunity income, as is new capital investment, but that management (the vessel captains) is earning above what it would in its best alternative.

The larger vessels typically possessed about 1.4 times the fishing power of the typical smaller vessels; engine horsepower was the most significant predictor of fishing power. However, multiplication of the vessel fishing power index by the transformed fuel consumption variable (the best proxy for vessel utilization), showed that the average larger vessel exerted only 15 percent more effort in the fishery than did the typical smaller vessel.

Profitability

The economic condition of the vessels operating in this mature fishery experiencing increased effort was analyzed. In contrast to 1971, which was an outstanding year for shrimp production, for 1972 through 1975 annual production varied only 8 percent from the mean annual production of those years. Thus, the profitability analysis applies to a period of stable total production, the significant diesel fuel price increase of 1974, and generally rising ex-vessel prices. It is an inherent characteristic of fisheries utilization that profits received by current users are often quite different from those experienced by entrants responding to profitability signals. The disparity is in part due to dissimilar cost structures related to the size and age of vessels. In order to depict the signals the fishery can produce, two measures of profitability were estimated.

Profit was initially calculated from sampled vessels' accounting records for the 1971-75 period. The average return to investment and management for the small vessel class over the period was

Typical shrimp vessels.

approximately 38 percent (Table 1). Vessels larger than 55 feet experienced a 4 percent return. Since acceptable estimates of the vessels' market value were not available, these returns refer to original investment. The smaller vessels averaged 23 years old in 1975, compared with 9 years for the larger vessels. The original costs were consequently much lower than they would be if the vessels had been constructed and purchased more recently. In addition, the smaller vessels have less onboard electronics and lower gear costs. These factors lower the original investment in the smaller vessels vis-a-vis the larger vessels. the result is an excellent percentage return on a meager investment even though average profit per vessel actually is quite low.

Table 1.—Average profitability of shrimp vessels in South Carolina for the period 1971-75, by size.

Item	55 feet or less	Over 55 feet
Observations	18	23
Total original investment	$266 267	$1 184 225
Average annual profit[1]	$101 972	$ 47 566
Return to original investment and management	38 3%	4 0%

[1]Computed as gross revenue minus total costs (exclusive of captain's share). This method was utilized because 90 percent of the vessels sampled were owner operated. Captains offered no useful insight as to how management returns are separated from returns to investment.

A prospective entrant to the fishery faces the purchase of a new or used vessel with a cost structure likely different from the average vessel in the fleet. The entrant normally receives a loan for the vessel. As evidenced by the average age of larger vessels, the entrants tend to be larger, more expensive fishing platforms. Captains obtaining financing in South Carolina are required by the lender to purchase hull insurance (Jones[1]). Entrants are then likely to experience higher costs than the vessels sampled, particularly when compared with the smaller vessel class. Vessels in the fishery operating without the expense of hull insurance may appear to earn higher returns. However the returns relate to a higher degree of risk. The operators are simply insuring themselves against loss of the vessel. People contemplating entering the shrimp fishery may not be fully aware of the impact this risk assumption and financing charges can have on net revenues.

[1]Jones, T M 1977. A productivity and profitability analysis of the South Carolina double-rig shrimp fishery; A case study of a specialized one year class fishery Unpubl. Ph.D. Thesis, Clemson University, Clemson, S.C., 121 p.

The second approach to profitability was one involving the placement of all sampled vessels on the same risk and financing basis. Tables 2 and 3 are the derived income statements for the average vessel in each year for small and large vessels, respectively. It must be stressed that these are average costs for firms incurring the particular categories of cost. The impact on returns to investment as compared with Table 1 are dramatic.

Table 2.—Typical income statement for South Carolina shrimp vessels 55 feet or less, 1971-75 and period average.

Item	1971 *n*=7	1972 *n*=10	1973 *n*=12	1974 *n*=16	1975 *n*=19	Period average
Variable costs						
Repairs/maintenance	$ 2,047	$ 1,954	$ 2,560	$ 2,127	$ 3,011	$ 2,340
Ice	338	379	465	538	948	550
Fuel/oil	1,337	1,217	2,268	3,036	3,571	2286
Nets	807	924	591	820	1,240	876
Crewshare	5,130	3,633	7,646	4,572	7,602	5,717
Heading/packing	2,789	1,387	1,643	1,469	1,545	1,747
Supplies	1,051	1,317	906	2,015	1,364	1,331
Other	512	260	613	1,107	939	686
Total	14,011	11,071	16,692	15,684	20,220	15,533
Fixed costs						
Insurance	424	437	202	781	1,179	605
Taxes	212	153	169	148	221	181
Interest	294	254	485	796	716	509
Depreciation	1,679	1,707	1,534	1,768	2,097	1,757
Dues	25	25	25	25	26	25
Licenses	120	69	99	84	101	95
Office supplies	430	112	100	53	214	176
Legal/account expenses	186	132	173	210	215	181
Utilities	103	81	114	251	100	131
Other	781	970	1,812	1,549	1,399	1,302
Total	4,254	3,940	4,713	5,665	6,268	4,962
Total, all costs	18,265	15,011	21,405	21,349	26,488	20,495
Total revenue	17,937	12,800	22,437	16,894	26,162	19,246
Net revenue	-328	-2,211	1,032	-4,455	-326	-1,249
Return to original investment and management	-2.6%	-16.7%	7.8%	-32.9%	-2.4%	-9.4%

Table 3.—Typical income statement for South Carolina shrimp vessels over 55 feet, 1971-75 and period average.

Item	1971 *n*=6	1972 *n*=9	1973 *n*=13	1974 *n*=21	1975 *n*=21	Period average
Variable costs						
Repairs/maintenance	$ 4,165	$ 3,617	$ 3,963	$ 3,559	$ 3,404	$ 3,741
Ice	727	917	664	501	780	718
Fuel/oil	2,490	3,086	3,629	4,984	5,841	4,006
Nets	593	1,863	1,521	1,320	1,066	1,272
Crewshare	6,746	9,302	12,311	7,787	13,149	9,859
Heading/packing	2,336	1,961	2,403	2,619	2,040	2,682
Supplies	4,325	2,619	2,681	2,885	1,899	2,682
Other	1,201	1,362	1,119	888	1,062	1,124
Total	22,583	24,727	28,291	24,543	29,241	26,084
Fixed costs						
Insurance	1,950	2,302	2,110	2,276	2,512	2,230
Taxes	701	500	272	375	1,343	638
Interest	2,496	2,802	1,791	1,709	1,845	1,929
Depreciation	3,659	4,052	5,088	5,129	4,893	4,564
Dues	25	25	30	30	29	27
Licenses	92	132	130	97	136	118
Office supplies	131	85	85	325	183	162
Legal/account expenses	112	275	359	254	233	247
Utilities	—	—	44	182	86	62
Other	2,622	2,317	1,844	1,830	2,139	2,150
Total	11,788	12,490	11,753	12,207	13,399	12,127
Total, all costs	34,371	37,217	40,044	36,750	42,640	38,211
Total revenue	31,157	30,314	40,596	27,092	44,040	34,638
Net revenue	-3,214	-6,903	542	-9,658	1,400	-3,573
Return to original investment and management	-6.3%	-13.7%	1.1%	-19.0%	2.8%	-6.2%

The conclusion from comparing Table 1 with Tables 2 and 3 is that profits in the South Carolina shrimp fishery for the 1971-75 period accrue primarily to smaller, older vessels and those vessel owners accepting the risk of self insurance. Prospective entrants should, therefore, carefully review the following: 1) Their intentions to purchase a certain size vessel, 2) the availability of equity capital, and 3) the need to increase the days fished on shrimp grounds in other states.

Productivity

The average productivity of labor, capital, and management was estimated for each year throughout the period. This approach was necessary to identify important relationships often obscured by inflation and profitability measures of firms experiencing rising product prices. Vessel productivity in each year of the observed time period was initially determined. Subsequent analysis quantified the labor input annually for 1971 through 1975. All value of production figures were deflated to 1972 dollars and converted to pounds to eliminate the effects of price variations. Table 4 summarizes the findings.

Annual productivities per vessel and per crewman show downward trends during the study period although they were interrupted by an upturn in 1974. One reason for this brief upturn could have been that the exceptionally low prices to producers in 1974 led to more intensive effort to compensate for the low product prices. A backward bending short-run supply curve for effort may exist in the state's shrimp fishery. This circumstance occasionally occurs over short periods when labor is unable to find better employment (Boulding, 1966).

Over the study period the productivity of labor declined 12.7 percent per year. This decrease is substantially larger than that in any of the 17 fisheries studied by Bell and Kinoshita (1973). The South Atlantic shrimp fishery in the Bell and Kinoshita study averaged a 0.7 percent increase in labor productivity between 1950 and 1969. Declining productivity is often

associated with lagging profits, wages, and employment. A disparity between economic and accounting profits among vessels of different sizes was previously outlined. The next section reviews the results of the study in relationship to opportunity wages.

Opportunity Wages

Returns to labor and management were determined from survey information. The average annual crew payment was determined for each firm responding. An examination of crew payment methods showed a consensus as to division of crewshares. On vessels operating with a crew of two, the captain generally received 25 percent of the gross and the striker 15 percent. These figures convert to 62.5 and 37.5 percent, respectively, of the wages paid. Similarly, on a vessel manned by a crew of three, the crewshare is generally 20 percent of the gross for the captain and 10 percent for each striker. This converts to a 50-25-25 percent split of the total wages.

As previously outlined, the crew was classified into management (the captain) and labor (the strikers). The wage analysis was developed by crew size and vessel size (Table 5). The income levels reported are below national and regional averages and established poverty levels. Extenuating circumstances may prevail in some cases. Income may be supplemented by off-season employment income. In addition, the predominance of owner-operated vessels means that many captains have the net boat share to claim. When the net boat share or profit was calculated on an accounting basis, the returns were often positive.

The first employment income comparison was made using the prevailing minimum wage. The $2.30/hour wage is characteristic of low-skill jobs. While many strikers are proficient, the work ranks among the lower skilled. Daily operations of shrimp vessels commonly range from 10 to 14 hours in the study area. A standard 8-hour day is used as a basis for comparison. The minimum wage would yield daily earnings of $18.40. The typical striker in no case averaged earning minimum wages for even an 8-hour day. Since South Carolina vessels basically operate on a day-trip basis, the potential value of food and of living on board is too low to change the conclusions.

The primary industry along the South Carolina coast competing for unskilled labor is the pulp and paper industry (Calder et al., 1974). In 1971, the average income for nonfarm laborers was $4,847 (U.S. Bureau of the Census, 1973). Clearly, strikers in the South Carolina shrimp industry earned below their opportunity returns on a daily work basis.

The captain's share ranged from a high of $4.13/hour to a low of $2.86/hour based on the assumption of an 8-hour work day. The highest average seasonal earnings were $5,914 for a 7-month shrimping season, or the equivalent of $10,140 on a 12-month basis. This compares favorably with the median yearly income of nonfarm foremen of $9,057 (U.S. Bureau of the Census, 1973). The comparisons were made with minimum wages and nonfarm labor categories because of the pulp and paper industry demand for labor in the coastal area. According to these comparisons, labor was earning below its local opportunity income, and captains operating their own vessels received income above their opportunity income. Captains owning their vessels also benefit in the long run from appreciation in vessel value.

Table 4.—Firm and labor productivity in the South Carolina shrimp fishery, by years, 1971-75.

Item	1971	1972	1973	1974	1975
			Pounds		
Average productivity per vessel	15,166	11,517	11,142	13,557	8,568
Average productivity per striker[1]	11,598	8,416	7,737	9,464	5,909
			Percent		
Change in vessel productivity from previous year[1]	—	(24.1)	(3.3)	21.7	(36.8)
Change in striker productivity from previous year[2]	—	(27.4)	(8.1)	22.3	(37.6)

[1]Shrimp vessel crewmen are identified as "strikers."
[2]Numbers in parentheses represent negative values

Fishing Effort

The firm-oriented results of the analysis of South Carolina shrimp vessels previously presented must be viewed along with the industry analysis. An investigation of fishing effort on a vessel and fleet basis was conducted in order to provide additional information. The usual way to examine fishing effort has been to determine the physical factors or inputs that are significantly related to output. These variables determine the fishing power of a vessel. A second component is the time or utilization factor relating to the intensity with which the physical plant is used.

The fishing power or physical plant model included the following physical attributes: Age of vessel, vessel length, beam, draft and horsepower, total net width, and electronic package. These were the independent variables regressed in a linear model against annual landings per sampled vessel. Each vessel class had models for each of the years 1971 through 1975 and one for the entire period. For the smaller vessels, horsepower was significant at the 95 percent level in 1975 and highly significant (99 percent level) for the entire period. For the larger vessels, horsepower was highly significant in 1973, and significant in 1972, 1974, and for the entire period. The all-vessel regression equation for the 1971-75 period was:

$$Y = 1939.88 + 104.46X \qquad (1)$$

where: Y=pounds of shrimp landed per time period,
X=engine horsepower of vessel; significant at 95% level;
R^2=0.41, n=40.

Using the information in Equation (1), an effort index was computed in

order to delineate the difference between the two vessel classes. Equation (2) shows the relationship as:

$$E_{ij}=\frac{(HP_{ij})^{0.6964}}{(HP_{\bar{x}j})^{0.6964}} \quad (2)$$

where: E_{ij}=the physical effort exerted by the jth vessel in the ith class,

HP_{ij}=the horsepower of the jth vessel in the ith class,

$HP_{\bar{x}i}$=the mean horsepower of vessels in the ith class.

The exponent (0.6964) for the general equation is obtained by adjusting the all-vessel period regression coefficient (104.46) from its season-long value to a daily value by assuming 150 fishing days per season. Equations (3) and (4) show the effort indices for the two vessel classes:

$$E_{Sj}=\frac{(HP_{ij})^{0.6964}}{(174)^{0.6964}} \quad (3)$$

$$E_{Lj}=\frac{(HP_{ij})^{0.6964}}{(273)^{0.6964}}. \quad (4)$$

A comparison of the relative fishing power of the typical vessel in each of the classes is provided by:

$$\frac{E_{Lj}}{E_{Sj}}=\frac{(273)^{0.6964}}{(174)^{0.6964}}=1.368. \quad (5)$$

The ratio of these indices indicates that the average vessel in the large class exerts approximately 1.4 times the fishing power of the average vessel in the small class. Application of the physical effort concept could be made to individual vessels as well as to representatives of vessel classes.

A utilization factor shows to what extent the physical plant was utilized. However, measuring utilization is difficult. Log books or other records are only occasionally encountered among vessel operators. Several attributes of the captain (age, education, experience, owner-operator) and his operation (days fished in South Carolina, days fished out-of-state, annual fuel consumption) were considered as possibly relevant utilization factors. In a regression analysis of these factors against annual landings, fuel consumption was significant in each year and vessel class.

The small vessel (6) and large vessel (7) equations for the 1971-75 period are:

$$Y=4259.48+1.17\,X_1** \quad (6)$$
$$R^2=0.58$$

$$Y=2411.12+1.19X_1**+282.16X_2* \quad (7)$$
$$R^2=0.52$$

where: Y=pounds of shrimp landed per time period,

X_1=gallons of fuel consumed per time period,

X_2=years of experience as a captain.

*=significant at the 95 percent level.

**=significant at the 99 percent level.

Levi and Gianetti (1973) previously found similar values in incorporating fuel consumption in an effort index. To overcome the difficulty of measuring time, and since fuel consumption was a significant variable, fuel consumption was converted to a measure of time. Fuel consumption annually per vessel was adjusted by hourly fuel consumption rates into annual hours of operation. This figure was divided by an assumed 10 hours fishing per day into fuel-equivalent days and was the time proxy variable used in calculating fishing effort. A 10-hour fishing day was used to characterize this predominantly day-trip fishery.

Table 5.--Earnings of South Carolina shrimp fishermen, by crew and boat size, 1971-75.

Item	Size of crew		Vessel class	
	Two	Three	Small	Large
	Number			
Crews observed	21	19	17	23
Avg. days fished	149	194	158	179
	Average seasonal income (dollars)			
Captains	4,214	5,738	3,616	5,914
Strikers	2,541	2,869	2,075	3,156
	Average daily income (dollars)			
Captains	28.28	29.58	22.89	33.04
Strikers	17.05	14.79	13.12	17.63
	Range of average daily incomes (dollars)			
Captains: Low	5.83	4.82	4.82	14.50
High	67.36	60.16	60.16	53.85
Strikers: Low	3.50	2.41	2.41	8.70
High	40.40	30.07	30.07	40.42

Table 6.—Effect of horsepower and fuel consumption on shrimp production in South Carolina, 1971-75.

Year	Equation[1]	n	R^2
	Small vessels		
1971	$Y=-20{,}967.96+195.70X_1+9.26X_2$	6	81
1972	$Y=-4{,}259.62+52.53X_1+12.01X_2**$	9	92
1973	$Y=-6{,}447.82+159.46X_1**+3.84X_2$	10	75
1974	$Y=-10266.30+115.15X_1+12.69X_2$	13	51
1975	$Y=6{,}421.95-37.32X_1+15.21X_2**$	17	83
1971-75	$Y=-1{,}622.96+42.75X_1+11.64X_2*$	18	64
	Large Vessels		
1971	$Y=22{,}973.72-29.59X_1+22.68X_2$	6	36
1972	$Y=-14{,}110.36+81.45X_1+22.21X_2**$	9	88
1973	$Y=-2{,}094.89+66.25X_1*+9.37X_2*$	13	66
1974	$Y=7{,}077.72+17.32X_1+20.59X_2**$	19	64
1975	$Y=9{,}495.24-7.73X_1+13.56X_2**$	19	45
1971-75	$Y=6{,}184.08+2.73X_1+20.39X_2**$	21	54
	All vessels		
1971	$Y=8{,}293.71+10.60X_1+217.11X_2*$	12	61
1972	$Y=-8889.07+69.87X_1+202.27X_2**$	18	90
1973	$Y=-7087.45+133.29X_1**+100.93X_2**$	23	71
1974	$Y=3{,}637.35+23.13X_1+134.56X_2**$	32	58
1975	$Y=7{,}470.94-6.48X_1+284.45X_2**$	36	73
1971-75	$Y=4{,}865.62+17.44X_1+188.18X_2**$	39	65

Y = Pounds of shrimp landed per time period.
X_1 = Horsepower of vessel.
X_2 = Fuel equivalent days fished per season.
* = Significant at the 95 percent level.
** = Significant at the 99 percent level.

Regression models with horsepower and fuel-equivalent days as independent variables are shown in Table 6 for small, large, and all vessels. Inclusion of the fuel-equivalent days variable with horsepower improved the R^2 and lowered the error of the estimators.

The mathematical expression for total effort can be written as:

$$FE_i = \sum_{j=1}^{n} (E_{ij})\ (FD_{ij}), \qquad (8)$$

where: FE_i = the total fishing effort exerted by all vessels in the ith class,
E_{ij} = the fishing power exerted by the jth vessel in the ith class, and
FD_{ij} = the fuel-equivalent days fished by the jth vessel in the ith class.

Equations (9) and (10) show the indices for the two vessel classes aggregated for interclass comparison of fishing effort. These indices represent the period average as being:

$$FE_S = \sum_{j=1}^{18} (E_{Sj})\ (FD_{Sj}) = 1{,}962, \qquad (9)$$

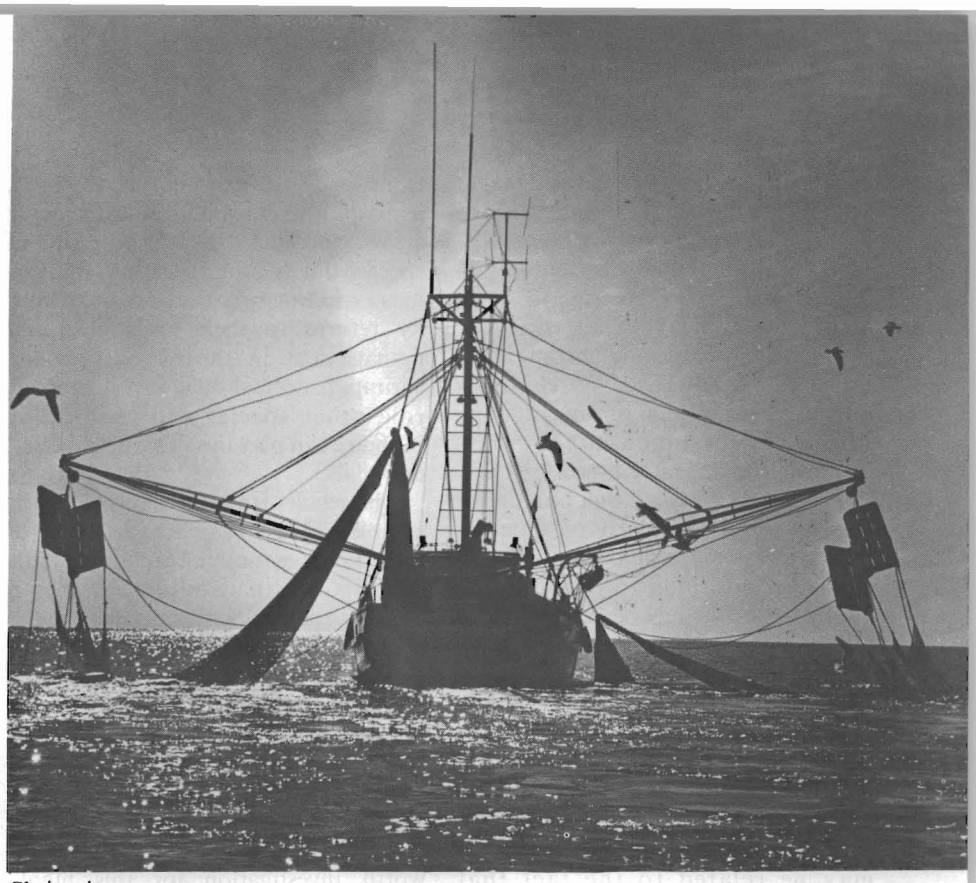
and

$$FE_L = \sum_{j=1}^{21} (E_{Lj})\ (FD_{Lj}) = 2{,}598. \qquad (10)$$

The class of larger vessels exerted about 32 percent more fishing effort during the 1971-75 period than did the smaller vessels. However, on a per vessel basis, this means that large vessels actually exerted only 15 percent more effort than the average small vessel.

Implications

The implications of the study results are pertinent to firm level decisions and those made on an industry-wide basis by resource managers. The analysis covered a period (1971-75) when annual South Carolina shrimp production varied approximately 8 percent from the mean annual production. Significant fuel price increases and generally rising ex-vessel prices occurred during the period. The population of resident double-rigged shrimpers was stratified as those 55 feet and less in length and those longer than 55 feet.



Shrimping.

Profitability is one element of an investment decision which must receive major consideration. The analysis points out that vessels in the smaller class earned 38 percent on the original investment as compared with 4 percent for the larger vessels. These profits, it must be recalled, were based on accounting records of sampled vessels.

A further step in the profitability analysis was to put all sampled vessels on the same risk and financing basis. The initial analysis demonstrated that profits on original investment were related primarily to the fact that small vessel owners were operating without hull insurance or interest payments on vessel mortgages. The small vessels averaged 23 years old and the larger vessels 9 years old. Older vessels are frequently unable to get hull insurance and, therefore, operate on a 100 percent owner equity basis.

When all vessels were put on the same risk and financing basis, smaller vessels were projected to experience a negative 9 percent return on investment and larger vessels a negative 6 percent return on investment. These figures reflect the average earnings an entrant would have experienced during the period.

Entrants commonly face mortgage payments by lenders unwilling to make loans without adequate hull insurance. The implication is that prospective entrants may be observing returns on investment of smaller, older vessels carrying considerably more risk than an entrant purchasing a larger vessel with borrowed money from lenders unwilling to accept risks.

It is worth pointing out that, based on the average age of vessels in the two classes, it is obvious that entrants purchase larger vessels. While accounting measures of profit for the period indicate larger vessels earn lower returns, the placement of vessels on a

common basis reveals that larger vessels experienced lower losses on the average.

In analyzing the distribution of returns among strikers and management, the typical striker was not earning an opportunity income even on an 8-hour day basis. Vessel owners often experience high turnover among strikers. This is a problem for owner-operator and absentee owner alike.

The survey revealed that among the smaller vessels surveyed 63 different individuals were employed in the 49 available positions throughout the 1975 season. This 29 percent turnover rate compares with a turnover rate of 71 percent on the larger vessels. In 1975, 103 different individuals worked in the 60 striker positions on larger vessels.

Prospective investors should be aware that choosing a vessel size may impact labor availability. Turnover may be related to the fact that opportunity incomes are not being earned. However, it appears that the financial aspects of shrimp vessel ownership leave little room to alter the share system in order to shift more income to strikers. Perhaps one opportunity to do so lies in the fact that management, in this sample primarily owner-operators, was earning above opportunity income.

The smaller vessels surveyed infrequently sought shrimp or other species in out-of-state areas. The predominant focus of the effort was in Georgia waters. On the average, less than 10 percent of gross income was realized from out-of-state effort. Although larger vessels exhibited more mobility, the associated income was less than 15 percent of gross income. Both vessel classes infrequently sought income from species other than shrimp. Thus, a prospective entrant is basically facing a very specialized fishery in terms of species and area of operation. Individuals expecting to earn above opportunity returns to their investment and management in the South Carolina shrimp fishery should investigate the role other species and geographic mobility can play in achieving anticipated goals.

The results from the analysis of the sampled vessels should be reflective of the general economic conditions in the South Carolina double-rig shrimp fishery. The resident component of the shrimp industry is almost totally dependent on shrimp revenues and annually anticipate that the shrimp income will come from South Carolina harvests. Concerted efforts to develop supplementary fisheries for other species and manage the region's shrimp resource to encourage mobility are worth investigation for this highly species-and-area-specific fishery.

The analysis revealed that shrimpers reacted to the severe 1974 decrease of ex-vessel prices coinciding with major increases in fuel prices by exerting more fishing effort. This factor resulted in higher vessel and labor productivities in 1974 than those experienced in the excellent market year of 1973. Perhaps this indicates there is not as strong a case for an early season opening or extension of the season in times of economic stress as previously thought.

Bell and Kinoshita (1973) found almost no growth in labor productivity in the South Atlantic shrimp fishery for the period 1950-69. The results of the South Carolina analysis indicate that labor productivity decreased an average of 12.7 percent per year.

An issue raised by the findings of declining labor and vessel productivity, poor returns on investment, less than opportunity earnings of the labor component of the fishery, and no upward trend in landings is the role of the public sector in eliminating these characteristics. While major actions to eliminate the inherent problems are not common in fisheries management, it appears that there are enough signs to make it acceptable to consider declaring the fishery a conditional fishery in relation to National Marine Fisheries Service financial assistance programs. It is imperative to recall before completely endorsing the above idea that in good years the shrimp fishery is likely to be the financial springboard to development of fisheries for supplementary species. The analysis revealed that in spite of much larger size and capital investment, South Carolina vessels in the over-55-feet class exerted only 15 percent more fishing effort than the smaller vessels. Certainly there is significant latent fishing effort among these vessels alone to capitalize on shrimp fishery and underutilized species growth opportunities.

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