FLORIDA
SEA GRANT COLLEGE

Spiny Lobster, Stone Crab and Secondary Fishery Costs and Revenues in the Florida Keys, 1978-79 Season

by Fred J. Prochaska and Paul D. Landrum

Report Number 42 May 1981

Marine Research · Education · Advisory Services
A Sea Grant Program for Florida

SPINY LOBSTER, STONE CRAB AND SECONDARY FISHERY COSTS AND REVENUES IN THE FLORIDA KEYS, 1978-79 SEASON

Fred J. Prochaska
and
Paul D. Landrum

Food and Resource Economics Department
Institute of Food and Agricultural Sciences
University of Florida
Gainesville, Florida 32611

Report Number 42
Florida Sea Grant College
May 1981

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX TABLES

SPINY LOBSTER, STONE CRAB AND SECONDARY FISHERY COSTS AND REVENUES IN THE FLORIDA KEYS, 1978-79 SEASON

by

Fred J. Prochaska
and
Paul D. Landrum

INTRODUCTION

In 1979 6.3 million pounds of spiny lobster valued at $12.8 million were landed in the United States [3]. Florida was the leading producing state with production at 5.95 million pounds for a value of $11.71 million[1]. Within the state the value of spiny lobster production ranks second only to salt water shrimp. The Florida Keys in Monroe County is the principal producing area. Monroe County spiny lobster landings in 1979 were 5.48 million pounds valued at $10.95 million. In Monroe County the value of spiny lobster landings ranked second behind shrimp in 1979.

The objective of this study was to analyze production, costs and revenues for the multiple species fisheries in which spiny lobster fishermen in the Florida Keys participate. Results of the analyses provide (1) individual fishermen a base with which they can compare their own lobster operations to determine if any changes in their fishing practices are warranted, (2) analysis of the profitability of fishery alternatives to lobster fishing, (3) an economic base on which alternative lobster fishery management programs can be analyzed, and (4) economic information to support industries such as credit institutions, boat builders, etc.

Fred Prochaska is Professor of Food and Resource Economics, University of Florida. Paul D. Landrum is former Assistant in Agricultural Economics, University of Florida.

[1] 1979 Florida statistics are preliminary and are based on personal communication with Mr. Ernie Snell, National Marine Fisheries Service, Miami, Florida.

PROCEDURES

A field survey was conducted with spiny lobster boat captains during the summer of 1979 to obtain production, cost and revenue data for the 1978-79 seasons. The captains interviewed in the survey represent a statistical sample of boats within three geographical areas of the Florida Keys in order to insure accurate industry representation. Sample size and sampling procedures are based on a previous analysis of the Keys lobster fishery [5].[1] A total of thirty captains were interviewed. Ten captains were interviewed in the lower Keys area from Key West to Sugar Loaf Key. In the middle Keys, from Cudjoe Key to Grassy Key, eleven captains were interviewed. Nine questionnaires were completed with boat captains in the upper Keys area from Conch Key to Key Largo. Within each of these areas informal surveys were initially made with fishhouse owners and industry representatives to determine the distribution of boat sizes and fishing practices. Captains were then chosen for interview based on the distributions determined in the initial survey. Only captains based in Florida Keys ports and fishing in the Gulf and South Atlantic waters adjacent to the Florida Keys were included in the survey.

Production, cost and revenue data were analyzed by boat-size classes. The data were further divided into primary and secondary fisheries. A primary fishery is defined to be the fishery of first importance to the fisherman as a source of income. It is the fishery for which his vessel and gear are designed and it is the fishery he would participate in, given other things equal. A secondary fishery is one in which the fisherman participates when he is unable to fish in the primary fishery for reasons such as season, weather, etc. Generally, in a secondary fishery slight modifications of the vessel are required and a different gear type is used.

---

[1] A sample size of 21 firms was determined to be sufficient to place a bound of 10 percent on each side of the population mean to be estimated with a 95 percent confidence level [5]. Additional samples were taken to insure completed samples and to address further questions concerning secondary fisheries.

Data collected were from fishhouse records, captains' personal records and recall. Items such as pounds, dollars and costs were generally from records. Production characteristics, such as days fished per month, were based on recall.

In the first section of this report total costs and revenues from the combined (primary plus secondary) fishery operations are analyzed for the industry average and by four boat size classes. In the second section production practices, costs and revenues for the primary spiny lobster fishery are presented. Production practices, costs, and revenues in the stone crab, hook-and-line, and gill net secondary fisheries are then presented in the third section. Rates of return on investments are presented in the final section.

COSTS AND REVENUES FROM COMBINED FISHING OPERATIONS

Average net revenue earned from all fishing enterprises (spiny lobster, stone crab and fish) by spiny lobster firms[1] sampled was $15,691 for the 1978-79 season (Table 1). Average net revenue increased with increases in boat size from $10,463 for boats less than 27 feet to $16,891 for boats in excess of 42 feet in length. Differences in average net revenue by boat size class however, were minor for boats 27 feet and larger.

Gross revenue earned from the combined fishing operations averaged $53,371 for all firms. The range in gross revenue earned was from $24,240 for the smallest boat size class to $84,261 for the largest boat size class (Table 1). Total costs also increased with boat size from $13,777 to $67,370. Increased total costs offset the increased gross revenues earned by boats 27 feet and greater in length. Variable costs exceeded fixed costs for all boats.

Net revenue from the primary spiny lobster fishery averaged $14,880 for the industry with a range from $9,927 for boats less than 27 feet to $19,235 for boats greater than 42 feet in length. Net revenues from secondary fisheries varied widely by boat size. In the secondary fisheries net revenues tended to increase with boat size except for boats greater than 42 feet where a loss was actually experienced due to extensive losses in gill net fishing during the 1978-79 season.

The appropriate analysis for considering secondary fisheries depends on the individual firms production motivation and planning horizon. If the firm chooses to enter the lobster fishery on a full time basis without consideration of secondary fisheries, then all fixed costs should be attributed to the lobster fishing enterprise. In this situation the firm would plan for lobster revenues to cover all costs of the boat, engine, equipment and overhead. The decision to fish for a secondary species will then depend on revenues from the secondary fishery and only the variable costs of fishing in the

---

[1] Each boat or vessel is defined to be a firm since nearly all lobster fishermen only have one boat or vessel.

Table 1.--Costs and revenues of Florida Keys spiny lobster fishermen including both spiny lobster fishery and secondary fisheries, 1978-79 season[a]

Item	Total firms	Boat length (feet)			
		Less than 27	27-34	35-42	Greater than 42
SPINY LOBSTER:					
Gross revenue	40,912	20,862	34,395	39,725	61,961
Costs:					
Variable costs	23,063	9,751	16,766	23,491	38,056
Fixed costs	2,969	1,184	2,849	2,519	4,669
Total costs	26,032	10,935	19,615	26,010	42,725
Net revenue	14,880	9,927	14,780	13,715	19,236
SECONDARY FISHERIES:					
Gross revenue	12,459	3,378	6,995	14,442	22,299
Costs:					
Variable costs	9,510	2,272	4,262	9,619	19,828
Fixed costs	2,138	570	861	1,877	4,816
Total costs	11,648	2,842	5,123	11,496	24,644
Net revenue	811	536	1,872	2,946	-2,345
COMBINED FISHERIES:					
Gross revenue	53,371	24,240	41,391	54,167	84,261
Costs:					
Variable costs	32,573	12,003	21,028	33,110	57,885
Fixed costs	5,107	1,754	3,711	4,395	9,485
Total costs	37,680	13,777	24,739	37,506	67,370
Net revenue	15,691	10,463	16,652	16,661	16,891

[a]There were a total of 30 firms in the survey. Number of boats by size class were: less than 27 feet, 5 boats; 27 through 34 feet, 9 boats; 35 through 42 feet, 8 boats, and; greater than 42 feet, 8 boats.

secondary fishery. In this case, fixed costs which are prorated to the secondary fishery in this study should be added to fixed costs under lobster fishing in the costs and revenue budgets presented in this report. Sufficient information is presented in the detailed budgets in the appendix to make these adjustments.

As an alternative the firm may plan for a multiple fisheries operation when making capital investment decisions. In this case the fixed costs associated with the boat, engine, gear and overhead should be prorated to the individual fishing operations. This approach was taken in the present analysis and was determined to be the most appropriate for several reasons. Multiple species fishery enterprises offer diversity which helps to spread risk. Risks are high in most fisheries due to both biological and market variations. Future fisheries management programs may place limitations on fishing effort in any one fishery. These limitations will be more easily adapted to by firms with multiple species orientation. Finally, increasing cost of capital items requires full utilization of boats, engines and other fixed items. Multiple species operations help spread fixed costs.

SPINY LOBSTER FISHING

Spiny lobster fishing was the primary fishing activity of the 30 firms interviewed with approximately 75 percent of their total fishing effort directed to lobstering. This section of the report is concerned with production characteristics and costs and revenues generated from effort devoted to the lobster fishery. Detailed data are discussed for the industry average cost and revenue budgets. Comparisons of production practices, costs and revenues are made by boat size in aggregated categories. Detailed budgets are presented in the Appendix.

Production Characteristics

The average lobster fishing craft in the Florida Keys was determined from the sample to be 36.0 feet in length during the 1978-79 season (Table 2). The range in boat length in the survey was from 20 to 51 feet. Average hull age was relatively new with an industry average of 5.3 years. The newest boats were in the greater than 42 feet in length class while the oldest (average age of 8.6 years) were in the 35 through 42 feet length class. Ninety percent of the boats had fiberglass hulls (Table 2).

Average motor size was 258 horsepower with a range from 101 to 600 horsepower for individual boats in the survey (Table 2). Horsepower increased with boat size except in the case where craft less than 27 feet had higher horsepower ratings than the next size class. The reason for this was a large proportion of the small boats were powered by high horsepower gasoline engines compared to mainly diesel engines in the other size classes. Overall, eighty percent of the engines were diesel.

The maximum number of traps fished at the peak of the season ranged from 300 to 2,400 per boat for individual fishermen in the survey. The industry average was 1,085 (Table 2). Average number of traps fished per boat increased with increases in boat size from 660 for boats less than 27 feet in length to 1,425 for those larger than 42

Table 2.--Comparison of Florida Keys spiny lobster average production practices by boat size classes, 1978-79 season

Production item	Industry average	Size class (feet) Less than 27	27-34	35-43	Greater than 42
Hull:					
Length (ft.)	36.0	23.2	30.4	38.9	47.4
Age (yrs.)	5.3	7.8	4.6	8.6	1.5
Fabrication:					
Fiberglass (percent)	90.0	100.0	89.0	75.0	100.0
Wood (percent)	10.0	0.0	11.0	25.0	0.0
Engine:					
Horsepower	258.3	211.0	180.1	248.0	386.0
Fuel type:					
Gasoline (percent)	20.0	100.0	11.1	0.0	0.0
Diesel (percent)	80.0	0.0	88.9	100.0	100.0
Age (yrs.)	3.2	2.8	1.9	6.4	1.8
Traps:					
Number fished	1,085.0	660.0	1,055.6	1,043.8	1,425.0
Percent lost	28.1	18.6	28.8	30.7	28.5
No. pulled per day	255.5	180.0	223.9	280.0	313.8
Times pulled per season	36.5	27.4	27.3	48.5	40.5
Trip length (days)	1.3	1.0	1.0	1.5	1.8
Work days (hours):					
Running	2.3	1.2	1.8	2.6	3.4
Fishing	8.3	8.8	6.8	9.1	8.9
Unloading	.6	.5	.5	.6	.6
Total	11.2	10.5	9.1	12.3	12.9
Catch (pounds):					
Per trap per season	16.5	13.0	14.0	16.5	19.4
Per trip	157.5	89.7	114.9	142.5	263.0

feet. These data represent maximum numbers fished since an average of over 28 percent of the traps were lost annually. These losses were due to vandalism, weather, sea turtles, and natural deterioration. Small boats experience a much smaller percentage loss because they generally fish in shallow, more protected waters out of the main traffic areas.

The number of traps pulled per day and the number of times each trap is pulled per season is positively correlated with boat size. For the industry, an average of 256 traps are pulled per day fished. The number of traps pulled per day ranges from 180 to 314 as boat size increases. Each trap is pulled an average of 36.5 times per season.

The average work day during the 1978-79 season was 11.2 hours (Table 2). This work day consisted of 8.3 hours of fishing time, 2.3 hours running to and from the fishing grounds and .6 hours unloading time. Both running time and fishing time per day were greatest for the largest boat size class.

Average catch per trap per season was 16.5 pounds. Catch per trap per season increased with boat size from 13.8 pounds for boats less than 27 feet to 19.4 pounds for those greater than 42 feet in length. Average catch per trip was 157.5 pounds. Catch per trip also increased with boat size.

Industry Costs and Revenues

Cost and revenues averages for the total industry are based on the thirty spiny lobster firms interviewed (Table 3). Costs and revenues for individual firms vary widely about the industry averages. Production and investment decisions for boats of varying sizes should be based on information presented in budgets by boat size. Detailed budgets for specified boat sizes are presented in the Appendix. The average industry budget is discussed in the text to show the overall conditions in the industry and to show ranges in individual costs and returns items. Quantity and cost of individual items represents only the expenditures for lobster fishing when the

Table 3.--Industry average costs and revenues analysis for Florida Keys spiny lobster fishermen, 1978-79 season

Item	Quantity units	Average Quantity	Average Dollars	Range (dollars) Minimum	Range (dollars) Maximum
Revenue:					
Spiny lobster	pounds	17,895	40,912	7,999	81,375
Costs:					
Variable costs					
Fuel	gallons	5,973	3,400	760	10,395
Oil	quarts	116	75	(4) 0	306
Oil change	frequency	6	84	(1) 0	301
Bait:					
Fish	pounds	8,877	1,870	(13) 0	10,440
Cowhide	pounds	4,017	1,427	(20) 0	13,965
Ice	pounds	2,578	131	(26) 0	1,596
Crew	number	1	8,339	(8) 0	19,688
Gloves	pairs	135	178	14	510
Paint and brushes	number	14[a]	125	(1) 0	754
Scrub brushes	number	13	32	(5) 0	96
Boots, raingear and aprons	number	9[b]	63	8	127
Traps	number	466	4,610	875	10,888
Repair costs					
Hull			403	(1) 0	1,095
Engine			292	(15) 0	2,301
CB			5	(25) 0	62
VHF			0	(29) 0	10
Fathometer			15	(23) 0	300
Loran			0	(29) 0	13
Puller			160	(3) 0	800
Traps			1,857	375	7,200
Total variable costs			23,063	5,509	48,972
Fixed costs					
Depreciation					
Hull			1,386	80	3,714
Engine			1,044	192	5,667
CB			68	(3) 0	200
VHF			60	(15) 0	600
Fathometer			93	(5) 0	343
Loran			22	(28) 0	521
Puller			118	62	214
License			50	50	50
Registration			23	10	50
Insurance			103	(26) 0	1,500
Dockage			2	(28) 0	30
Total fixed costs			2,969	586	10,432
Total costs			26,032	7,062	52,846
Net revenue			$14,880	$-3,967	$47,170

() Denotes number of firms with a zero value.

[a]Average quantity includes 10.93 gallons of paint and 3.18 paint brushes.

[b]Average quantity includes 1.01 pairs of boots, 0.80 suits of raingear, and 7.63 aprons.

item is also used to fish for secondary species. Repair and depreciation costs are also proportioned according to the percentage of time the craft, engine and equipment was used for lobster fishing.

The average firm in the industry landed 17,895 pounds of lobsters valued at $40,912 (Table 3). The range of $7,999 to $81,375 for individual firms was considerable. Crew wages and shares were the largest cost item at $8,339. This expense ranged from zero for the eight firms without crewmen to $19,688 for one firm (Table 3). Cost of traps was the second largest expenditure item. Total costs for traps averaged $4,610 per boat. This represents the cost of materials only, since nearly all fishermen built their own traps. Approximately 4 percent of the traps were reported to be purchased used from other fishermen. Additional repair cost for traps was $1,857. This brought total annual costs for traps up to $6,467.

Average expenditure for fuel was $3,400 with a range of $760 to $10,395 for individual boats. Four firms had gasoline engines which did not require oil between oil changes. Fuel and oil expenditures together accounted for 15 percent of total variable costs.

Total bait costs nearly equaled the cost of fuel. The average bait expenditure by all fisherman is $1,427 for cowhide and $1,870 for other bait annually. However, some fishermen use only one type of bait. Twenty-three percent of the fishermen did not use either type of bait. Instead they used "shorts" (undersized lobsters) as an attractant in the traps. The ten fishermen who purchased cowhides had average expenditure of $4,280 annually. Considering the ranges in individual expenditures, some firms had bait costs which exceeded fuel costs. However, considering average bait costs and average number of traps fished, only slightly more than $3.00 is spent per trap for bait.

Repair costs for the average firm exceeded $2,700 annually. Trap repairs were the most costly item followed by hull and engine repair costs of $403 and $292, respectively. Very few firms had repair costs for electronic equipment. This is evident from the large number of firms reporting zero costs for specific electronic equipment such as VHF radios (Table 3).

Total depreciation costs using the straight line method of calculation amounted to $2,791 annually. Hull and engine depreciation at $1,386 and $1,044, repsectively, accounted for nearly all of total depreciation costs. Traps were not included as fixed costs even though the average trap lasts approximately three years. Approximately one-third were replaced each year. Other minor fixed costs brought total fixed costs up to $2,969 annually. For individual firms fixed costs ranged from as low as $586 to as high as $10,432. Total costs were $26,032.

Net revenue for the average firms was $14,875.21 from lobster fishing during the 1978-79 season. The range for the industry was from a loss of $3,967 to a high of $47,170.

Costs and Revenues by Boat Size

Total variable costs for each item generally increased with boat size as was expected (Table 4), with the largest increases occurring between the two largest boat size classes. This was primarily due to the increased number of traps fished and number of crewmen necessary to man the larger operations. Depreciation also increased substantially with increased boat size classes except for the 35 through 42 foot class[1]. Total costs per pound of lobster landed increased with vessel size. Variable costs per pound increased from $1.07 for the smallest boats to $1.38 per pound for the largest boats.

Total gross returns from lobster fishing ranged from $20,862 for boats less than 27 feet to $61,961 for boats over 42 feet in length (Table 4). Total costs increased but less than in proportion so that net revenue increased with boat size. The exception occurred where the 35 through 42 foot boats earned $13,715 compared to $14,780 for the 27 to 34 foot class. Boats in the 35 through 42 foot class did not report increased revenues in proportion to increased costs over the smaller

[1]One rather old wood vessel and engine was in the 35 through 42 foot class. This accounted for part of this discrepancy.

Table 4.--Costs and revenues for Florida Keys spiny lobster fishing by boat size, 1978-79 season

Item	Total firms	Boat length (feet) Less than 27	27-34	35-42	Greater than 42
			Dollars		
Spiny lobster revenue	40,912	20,862	34,395	39,725	61,961
Costs:					
Variable costs:					
Fuel and oil	3,559	1,770	2,413	3,855	5,671
Bait	3,297	1,753	1,281	3,464	6,363
Ice	131	34	0	73	399
Crew	8,339	2,532	5,990	8,314	14,636
Traps	4,610	2,088	4,256	4,250	6,946
Repairs	2,732	1,426	2,447	3,019	3,582
Other	399	148	379	516	459
Total variable costs	23,063	9,751	16,766	23,491	38,056
Fixed costs:					
Depreciation	2,791	1,093	2,528	2,352	4,585
Other	178	91	321	167	84
Total fixed costs	2,969	1,184	2,849	2,519	4,669
Total costs	26,032	10,935	19,615	26,010	42,725
Net revenue	14,880	9,927	14,780	13,715	19,236
Average costs per pound:					
Variable	1.29	1.07	1.14	1.37	1.38
Fixed	.17	.13	.19	.15	.17
Total	1.46	1.20	1.33	1.52	1.55

size boats. Costs of the larger boats do not appear to be out of line with the overall increases in costs as boat size increased (Table 4). Since all fishermen essentially received the same price per pound, the larger boats were not able to increase catch proportionally as costs increased. One boat in the 35 through 42 foot class was older, fished considerably less traps and fished each trap less frequently than others in that size class. Another boat in the same class was operated by a nonowner captain who reported catch somewhat smaller than the captain-owners with equal gear and equipment.

Although average net revenues are highest for the largest boat size class some individual firms with smaller boats earn higher net revenues (Figure 1 and Appendix Tables A2-A5). One firm in the 35 through 42 foot size class earned a net revenue from spiny lobster fishing of $47,170 (Appendix Table A4). This was higher than any boat in all size classes. Actually, there was at least one boat in each size class that earned net revenues higher than the average earned with the largest boats. However, there was also at least one boat in each size class except the largest that had a net loss.

A statistical analysis of differences in total costs, total revenue and net revenue between boat size classes was performed using an analysis of variance technique. Differences in means, or averages, for each of these variables were compared with differences in costs and returns for individual boats within size classes or groups. The purpose of this statistical analysis was to determine if the difference in costs and revenues between boat size classes was statistically greater than differences among individual firms. Statistical $\underline{t}$ values and significance levels are presented in Table 5.

Average total costs and total revenues are statistically significantly higher for boats greater than 42 feet in length than mean levels for all smaller boat size classes. Statistical confidence levels are 99 percent for these comparisons (Table 5). However, there was no significant statistical difference between average net revenues earned by boat size classes. This means that the variation in net revenues among individual boats within boat size classes was statistically as great as the difference between mean levels for boat size classes.

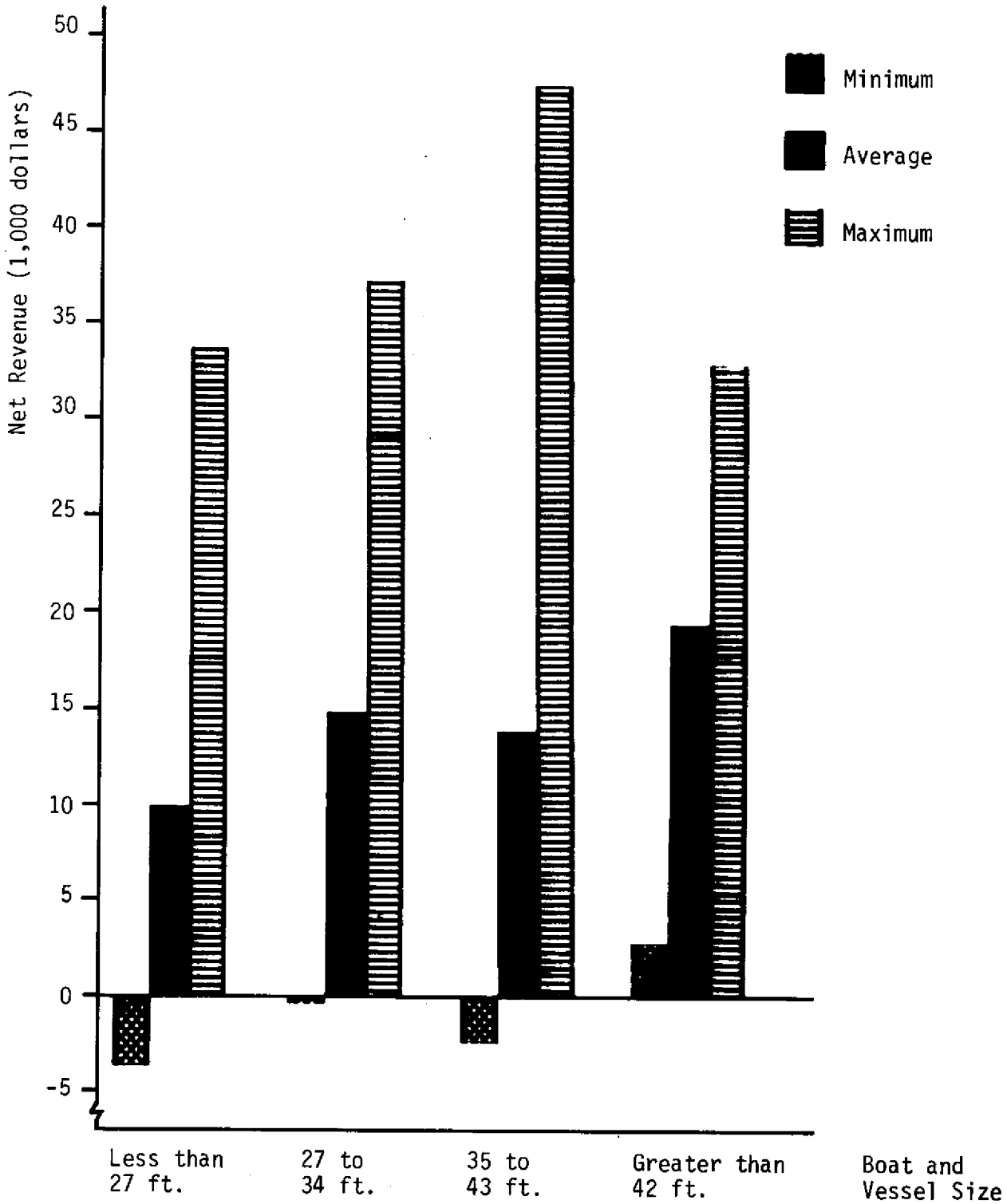

Figure 1. Minimum, maximum and average net revenue by boat and vessel length size classes, 1978-79 season

Table 5.--T values for revenue and costs differences between spiny lobster boat and vessel size classes[a]

Boat and vessel size class and costs and revenues	Boat and vessel size (feet)		
	27-34	35-42	Greater than 42
Less than 27 feet:			
Total revenue	1.52_{**}	2.08^{**}_{**}	4.53^{***}_{***}
Total costs	2.17	3.69	7.77
Net revenue	.66	.51	1.24
27-34 feet:			
Total revenue		$.69_{*}$	3.57^{***}_{***}
Total costs		1.83	6.63
Net revenue		.17	.70
35-42 feet:			
Total revenue			2.79^{***}_{***}
Total costs			4.66
Net revenue			.84

[a]Significant levels are indicated as follows: 10 percent = *, 5 percent = ** and 1 percent = ***.

Therefore, in these cases it is concluded that one boat size class does not produce a statistically significant different amount of net revenue.

Total costs were significantly greater for larger boats when all boat size classes were compared. Total revenue for the 35 through 42 foot size class was statistically greater than average total revenue produced by the smallest boat size class.

SECONDARY FISHERIES

Florida Keys lobster fishermen participate in a variety of fisheries as a complement to their lobster fishing enterprise. Some fishermen fish secondary fisheries during the lobster closed season from April 1 to July 25. Others fish for stone crabs during the stone crab season which runs from October 15 to May 15. And finally, some spiny lobster fishermen fish secondary fisheries at the same time as they lobster fish, however this is usually done during the latter part of the lobster season. Three of these secondary fishing enterprises are analyzed in this section. Seasonal costs and returns are analyzed for lobster fishermen who participate in the stone crab fishery. Daily or per trip costs and returns are then analyzed for hook-and-line fishing and small net boat fishing. Only daily or per trip costs were analyzed for these fisheries since relatively few trips were made and there was no definite season.

Stone Crab Fishing

Complete records on stone crab production were obtained from five captains who owned their own boats. These captains fished primarily for spiny lobsters but as lobster production began to decline, they began fishing for stone crab. An average of 4.4 stone crab fishing trips were made per month in October which is the opening month of the stone crab season (Table 6). This increased to 12.8 trips per month by January and then remained at this level until May when average number of trips declined to 10.4 per month. Most of the stone crab fishing activity originated from the middle Keys area.

An average of 1,600 stone crab traps were fished per boat. (Table 6). Approximately 19 percent were lost during the season. Each trap was pulled over 20 times per season with an average production of 7.56 pounds per trap per year valued at $18.02. On an individual trip basis an average of 139.43 pounds of stone crabs was landed at a value of $332.15.

Table 6.--Production characteristics for stone crab fishing by spiny lobster fishermen, 1978-79 season

Item	Average per firm
Trips:	
Number per month	
October	4.40
November	9.60
December	11.20
January	12.80
February	12.80
March	12.80
April	12.80
May	10.40
Total	86.80
Length (days)	1.00
Workday (hours):	
Run time/day	3.00
Fish time/day	7.80
Unloading time/day	0.56
Total hours worked/day	11.36
Traps:	
Number	1,600.00
Traps pulled/day	380.00
Times pulled/season	20.62
Traps lost:	
Number	304.40
Percent	19.02
Average boat length	38.20
Volume (pounds)	12,102.40
Per trap	7.56
Per trip	139.43
Value (dollars)	28,830.40
Per trap	18.02
Per trip	332.15

The average stone crab producer in the Florida Keys had stone crab sales equal to $28,830 during the 1978-79 season (Table 7) total crab sales ranged from $10,680 to $41,357.

Crew shares were the single most important variable cost item at $5,723 per season. Costs of repairs and bait were nearly equal at over $4,600 each. Bait for one firm was $8,400. Bait consists of mainly bait fish and fish heads and averaged $2.88 per trap for the season. Fuel and oil costs varied widely from $798 to $6,675 for the largest boat which was 51 feet in length. Total variable costs were $20,800 with a range from $5,619 to $30,305.

Prorated fixed costs were $2,622. This brought total costs to $23,422 for the season. On a per pound basis, total costs were $1.94. Average net revenue per boat per season was $5,408 with a range from -$2,569 to $12,918.

Some comparisons of stone crab production with spiny lobster production are possible. Stone crab production practices differ somewhat from spiny lobster production. Based on industry averages for both fisheries, stone crab fishermen fish over 500 more traps per boat than the average number of lobster traps per boat. Stone crab traps produced an average of nine pounds less stone crabs per trap than the average pounds of lobster landed per trap. Bait cost per boat for stone crab fishing in total is larger than bait costs per boat for spiny lobster fishing. This in part is due to the larger number of stone crab traps per boat, however, stone crab bait costs per trap averaged $2.88 compared to $3.04 per trap for lobster fishing. Average total revenue per trap per season for stone crabs is $18.02 compared to $37.71 for lobsters while net revenue per trap per season is $3.38 for stone crabs compared to $13.71 for spiny lobsters. However, stone crab production during the latter month of the lobster season does provide a relatively more profitable alternative than lobstering. The conversion from lobstering to stone crabbing starts heavily in January.

Table 7.--Costs and revenues analysis of stone crab fishing by Florida Keys spiny lobster fishermen, 1978-79 season

Item	Average	Range	
		Minimum	Maximum
	----------	Dollars	----------
Stone crab revenue	28,830	10,680	41,357
Costs:			
Variable costs:			
Fuel and oil	3,541	798	6,675
Bait	4,612	1,200	8,400
Crew	5,723	1,602	8,905
Traps	2,059	644	2,601
Repairs	4,676	1,306	5,924
Other	189	69	331
Total variable costs	20,800	5,619	30,305
Fixed costs:			
Depreciation	2,446	503	4,896
Other	176	6	763
Total fixed costs	2,622	566	4,926
Total costs	23,422	6,184	34,676
Net revenue	5,408	-2,569	12,918

Hook-and-Line Fishing

Hook-and-line fishing provides supplemental income to spiny lobster fishermen with a minimum of additional investments. It generally occurs during the summer months when the stone crab and lobster seasons are closed. An average of 29 trips were made by the eight lobster fishermen in the survey who fished with hooks and lines (Table 8). Production costs and revenue information are presented on a per day basis due to the supplemental nature of this secondary fishery.

An average working day in hook-and-line fishing is nearly 15 hours (Table 8). This consists of 11 hours of fishing with the remainder being running and unloading time. The average trip is 1.38 days. The majority of these trips are overnight trips, leaving in the mid-afternoon and returning the next day. Most acitivty occurs in June. By this time the spiny lobster fishermen have completed most of their post season work and have built traps for the following season.

Average catch per day was 135.0 pounds (Table 8). Since the average trip was 1.38 days, the average catch was 186.21 pounds per trip. This catch consists primarily of bottom fishing for reef fish. Principle species include tile and snowy grouper fished with hydraulic reels, snapper and grouper fished with electric reels, and other reef fish caught with hand lines and some rods and reels. Some yellowtail snapper were also landed with hand lines on the top of the reef. Two fishermen reported fishing for king mackerel with hooks and lines. However, since this fishery operates differently from the bottom fishing referred to in this section, king mackerel data are not included. For costs and returns information on hook-and-line king mackerel fishing see [4].

Average revenue produced per day fished was $121.64 (Table 9). Total variable costs per day were $72.27 while fixed cost averaged $28.16. Bait costs accounted for nearly one-half of variable costs. Chum which is used for yellowtail snapper fishing was included in bait cost. Fuel and oil were the second most important cost item at $12.97 per day. Only one of the eight boats had a crewman aboard.

Table 8.--Hook-and-line production practices by spiny lobster fishermen, 1978-79 season

Item	Average per boat
Trips:	
Number per month:	
July	5
August	1
September	1
October	0
November	0
December	0
January	0
February	0
March	1
April	4
May	8
June	9
Total	29
Length of trip (days)	1.38
Workday (hours):	
Run time/day	2.38
Fish time/day	11.00
Unloading time/day	1.50
Total	14.88
Average boat length (ft.)	32.00
Landings:	
Pounds of fish per day	135.00
Dollars of fish per day	121.64

Table 9.--Costs and revenues per day of hook-and-line fishing by Florida Keys spiny lobster fishermen, 1978-79 season[a]

Item	Average	Range	
		Mimimum	Maximum
	----------Dollars----------		
Revenue	121.64	42.72	225.00
Costs:			
Variable costs:			
Fuel and oil	12.97	6.24	31.31
Bait	29.37	7.00	143.00
Ice	5.64	1.05	11.20
Crew	11.25	(7) 0.00	90.00
Repairs	4.72	(1) 0.00	16.51
Miscellaneous hook-line equipment	7.40	0.92	20.01
Other	0.73	0.24	1.43
Total variable costs	72.27	28.50	177.14
Fixed costs:			
Depreciation	27.05	8.42	66.46
Other	1.11	0.07	6.15
Total fixed costs	28.16	9.57	72.61
Total costs	100.43	38.19	215.31
Net revenue:			
Above variable costs	49.37	2.16	99.00
Above total costs	21.21	-17.10	89.31

[a]Based on records from eight fishermen.
Numbers in () indicate number of fishermen with zero observations.

Revenue net of variable costs averaged $49.37 with a range of $2.16 to $99.00 for individual boats. If a fisherman is only supplementing income by hook-and-line fishing and would have the capital investments in boat and gear even if this secondary fishery were not available, net returns above average variable cost are appropriately considered. If in planning the investments hook-and-line fishing is considered to be a major part of the total enterprise, net revenue above total costs should be considered to maximize long-run profits. Net revenue above total cost averaged $21.21 per day with a range from -$17.10 to $89.31.

Small Gill Net Fishing

Three fishermen fished with gill nets ranging in length from 300 yards to 2,500 yards. Principle species landed with gill nets were mackerel, pompano, mullet and yellowtail snappers. This secondary fishery occurrs during the months January through April (Table 10) which are the months mackerel and pompano generally make their runs in fairly shallow water. During this period, these fishermen reduce lobster fishing activity. As was the case for hook-and-line fishing, production costs and returns analyses are presented on a per day basis. Total season budgets for both small-net and large-net boats are presented in [1].

A total of 41 trips were made by the average boat. The trips were to near-shore, shallow water areas and consisted of one day per trip. These one-day trips, however, were rather long with the average day being 16.33 hours (Table 10). Most of the work day, 12.33 hours, was spent fishing.

On an average day, 88.70 pounds of fish were landed at a value of $91.20 (Table 10). Daily total variable costs averaged $59.97 (Table 11). Crew shares and fuel and oil were the largest cost items at $20.55 and $21.10, respectively. Fixed costs, which includes net depreciation, averaged $64.10 per day fished. This cost would decrease on a per day basis if days fished increased. Total costs averaged $124.26 per day.

Table 10.--Gill net production by spiny lobster fishermen

Item	Average per boat
Trips per month (days):	
January	10.67
February	12.00
March	12.00
April	6.67
Total	41.34
Length of trip (days)	1
Work days (hours):	
Running	2.33
Fishing	12.33
Unloading	1.67
Total	16.33
Average boat length	32.33
Horsepower	236.00
Pounds of fish per day	88.70
Dollars of fish per day	91.20

Table 11.--Costs and revenues per day of net fishing by Florida Keys spiny lobster fishermen, 1978-79 season

Item	Average dollars
Revenue	91.20
Costs:	
Variable costs:	
Fuel and oil	21.10
Ice	9.00
Crew	20.55
Repairs	8.42
Other	.90
Total variable costs	59.97
Fixed costs:	
Depreciation	64.10
Other	.19
Total fixed costs	64.29
Total costs	124.26
Net revenues:	
Above total variable costs	31.23
Above total costs	-33.06

Net revenue above total variable costs was $31.23 per day. When total costs are considered, gill net operations resulted in a net revenue loss. Average loss was -$33.06. Whether or not fishermen should pursue gill net fishing for supplemental income depends on how gill net costs are viewed. Depreciation on nets averaged $50.53 per day fished. If these costs were considered as variable costs, there would be a loss above costs fishermen could control by not fishing. Since revenues exceeded all other variable costs, net profits may be possible if fixed costs (including net depreciation) were spread across a longer season or with more trips per month during the time period.

RATES OF RETURN ON INVESTMENT

The level of capital investment in the lobster fishery varied widely. Investment in boats less than 27 feet in length averaged $6,662 while investments in boats greater than 42 feet were over $49,000 (Table 12). When these investments were prorated to lobster fishing activities, the range was from $5,382 to $34,925 for boats less than 27 feet and those in excess of 42 feet in length, respectively.

Net revenues, or profits, to the captain-owner for his labor, management and investments as a percent of investment ranged from 184 percent for the small boats to 55 percent for the largest boats. These rates were with respect to lobster fishing only and are referred to as gross rates of return on investments (Table 12). The gross rates were less when the secondary fisheries were included. Gross rates of returns to the captain-owners for total fishing activities were 157 percent for the small boats. Gross returns as a percent of investment declined as boat size increased so that total gross returns for large vessels were only 34 percent.

Net returns, estimated as total revenue minus total costs, are returns to the captain for his labor, management skills and his investments. Salaries were estimated for each captain in order to determine a net rate of return on investment. Captain salaries were based on average crewman earnings within each boat size class. After estimated captains' salaries were subtracted from net revenues, the residual revenue was considered to be returns to investment and is referred to as net rate of return on investment in Table 12. This net rate actually represents a return to management and investment since the only wage information available was for crewmen who have no management functions. That is, their wage rate is expected to be lower than the captain's wage rate because they don't have to make management decisions.

Net rate of return on investment for lobster fishing alone generally decreased with size of investment. The smallest boats had a net rate of return on investment of 106 percent. The lowest return was 15 percent earned by boats in the 35 to 42 foot class. When both

Table 12.--Revenues on investment for Florida Keys spiny lobster fishermen by boat size, 1978-/9 season

Boat length size classes (feet)	Average investment	Gross rate of return on investment[a]	Net rate of return on investment[b]
	--Dollars--	----------Percent----------	
Lobster fishing only:			
Less than 27	5,382	184	106
27-34	15,028	98	34
35-42	24,366	56	15
Greater than 42	34,925	55	17
Lobster plus secondary fisheries:			
Less than 27	6,662	157	63
27-34	19,134	87	25
35-42	34,088	49	4
Greater than 42	49,073	34	11

[a]Gross rate of return on investment is defined to be net revenue divided by average investment.

[b]Net rate of return on investment is defined to be net revenue minus an imputed captain's wage divided by average investment. This represents a return to both investment and management.

lobster and secondary fishery enterprises are considered, the rates of return are lower. Net rate of return on investment was 63 percent for small boats and as low as 4 percent for boats in the 27 to 34 foot in length size class.

APPENDIX

Appendix Table A1.--Monthly fishing activities for Florida Keys spiny lobster fishermen, 1978-79 season

Activity	Boat or vessel size (feet)			
	Less than 27	27-34	35-42	Greater than 42
Traps fished per month:				
August	620.00	1,055.56	1,043.75	1,425.00
September	620.00	1,055.56	1,043.75	1,425.00
October	660.00	1,055.56	1,043.75	1,425.00
November	660.00	1,055.56	1,043.75	1,425.00
December	660.00	1,044.44	1,043.75	1,425.00
January	500.00	751.67	731.25	1,200.00
February	500.00	588.78	731.25	1,200.00
March	500.00	499.89	623.75	1,200.00
Trips per month:				
July	5.80	8.11	6.50	9.00
August	13.60	19.56	20.50	16.50
September	13.60	19.11	19.00	16.50
October	13.60	18.67	20.00	14.50
November	13.60	17.33	15.00	13.00
December	12.80	14.67	13.00	12.00
January	9.60	10.67	9.00	7.50
February	9.60	10.67	9.50	8.50
March	9.60	9.78	8.00	7.50
Total trips	101.80	128.56	120.50	105.00

Table A2.--Costs and revenues analysis for Florida Keys spiny lobster fishermen with boats less than 27 feet in length, 1978-79 season

		Average		Range (dollars)	
	Quantity units	Quantity	Dollars	Minimum	Maximum
Returns:					
Spiny lobster	pounds	9,131.00	20,861.60	7,999.00	50,270.00
Costs:					
Variable costs					
Fuel	gallons	2,579.00	1,676.35	828.75	2,320.50
Oil	quarts	127.50	79.05	(3) 0.00	306.00
Oil change	frequency	2.78	14.64	(1) 0.00	44.40
Bait (fish)	pounds	5,442.50	1,713.25	(2) 0.00	5,100.00
Cowhide	pounds	108.80	39.17	(4) 0.00	195.84
Ice	pounds	1,260.00	33.60	(4) 0.00	168.00
Crew wages	number	0.60	2,532.41	(2) 0.00	7,540.50
Gloves	pairs	49.32	55.37	14.00	120.00
Paint and brushes	number	6.17[a]	44.20	(1) 0.00	87.00
Scrub brushes	number	9.35	23.83	4.14	50.00
Boots, raingear and aprons	number	3.70[b]	22.86	8.00	37.30
Traps	number	325.00	2,088.00	875.00	3,663.00
Repair costs					
Hull		0.81	173.03	30.00	600.00
Engine		1.56	273.77	(2) 0.00	1,000.00
CB		0.09	1.79	(4) 0.00	8.94
VHF		0.00	0.00	(5) 0.00	0.00
Fathometer		0.09	4.47	(4) 0.00	22.35
Loran		0.00	0.00	(5) 0.00	0.00
Puller		0.72	30.06	(1) 0.00	50.32
Traps		539.00	943.25	700.00	1,500.00
Total variable costs			9,751.10	5,509.25	14,943.37
Fixed costs					
Depreciation					
Hull		6.00	498.90	80.00	1,000.00
Engine		5.20	428.47	191.57	666.67
CB		1.00	41.18	(1) 0.00	94.72
VHF		0.00	0.00	(5) 0.00	0.00
Fathometer		2.40	25.78	(3) 0.00	106.56
Loran		0.00	0.00	(5) 0.00	0.00
Puller		6.00	98.96	76.63	108.33
License			50.00	50.00	50.00
Registration			11.00	9.77	11.50
Insurance			29.60	(4) 0.00	148.00
Dockage			0.00	(5) 0.00	0.00
Total fixed costs			1,183.89	585.95	1,719.83
Total costs			10,934.99	7,062.42	16,412.38
Net revenue			$9,926.61	$-3,966.77	$33,857.62

() Denotes number of firms with 0 value.

[a]Average quantity includes 3.94 gallons of paint and 2.23 paint brushes.

[b]Average quantity includes 0.59 pairs of boots, 0.41 suits of raingear and 2.71 aprons

Table A3.--Costs and revenues analysis for Florida Keys spiny lobster fishermen with boats and vessels 27 feet to 34 feet in length, 1978-79 season

		Average		Range (dollars)	
	Quantity units	Quantity	Dollars	Minimum	Maximum
Returns:					
Spiny lobster	pounds	14,771.00	34,395.22	9,800.00	55,680.00
Costs:					
Variable costs					
Fuel	gallons	3,989.56	2,284.26	760.00	3,564.00
Oil	quarts	87.44	59.93	(1) 0.00	152.60
Oil Change	frequency	6.11	68.91	15.00	300.66
Bait (fish)	pounds	4,509.93	898.36	(5) 0.00	5,040.00
Cowhide	pounds	1,450.00	402.33	(7) 0.00	3,016.00
Ice	pounds	860.00	0.00	(9) 0.00	0.00
Crew wages	number	0.78	5,990.30	(3) 0.00	13,125.00
Gloves	pairs	113.51	147.02	24.00	420.00
Paint and brushes	number	15.77[a]	122.04	20.31	252.60
Scrub brushes	number	17.44	40.33	(1) 0.00	96.00
Boots, raingear and aprons	number	8.90[b]	69.78	31.10	126.56
Traps	number	422.77	4,255.89	2,160.00	7,350.00
Repair costs					
Hull		1.23	313.12	95.15	600.00
Engine		0.51	345.82	(6) 0.00	2,301.00
CB		0.78	15.70	(5) 0.00	62.37
VHF		0.07	1.12	(8) 0.00	10.08
Fathometer		0.17	4.14	(7) 0.00	20.72
Loran		0.00	0.00	(9) 0.00	0.00
Puller		1.25	198.80	(1) 0.00	800.00
Traps		751.67	1,567.92	375.00	3,000.00
Total variable costs			16,765.77	6,330.31	26,656.80
Fixed costs					
Depreciation					
Hull		6.89	1,246.50	220.00	2,682.00
Engine		6.22	811.19	236.07	1,526.40
CB		1.67	61.16	23.01	102.67
VHF		2.78	68.90	(3) 0.00	140.70
Fathometer		4.00	138.00	(1) 0.00	343.44
Loran		0.56	57.94	(8) 0.00	521.50
Puller		6.89	144.11	90.00	214.28
License			50.00	50.00	50.00
Registration			20.70	13.68	31.50
Insurance			244.73	(7) 0.00	1,500.00
Dockage			6.08	(7) 0.00	29.74
Total fixed costs			2,849.31	1,420.71	5,584.71
Total costs			19,615.07	7,751.02	32,240.51
Net revenue			$14,780.15	$-362.90	$37,284.96

() Denotes number of firms with 0 value.

[a]Average quantity includes 10.53 gallons of pait and 5.24 paint brushes.

[b]Average quantity includes 1.57 pairs of boots, 0.96 suits of raingear and 6.37 aprons.

Table A4.--Costs and revenues analysis for Florida Keys spiny lobster fishermen with boats and vessels 35 feet to 42 feet in length, 1978-79 season

		Average		Range (dollars)	
	Quantity units	Quantity	Dollars	Minimum	Maximum
Returns:					
Spiny lobster	pounds	17,165.25	39,725.00	15,000.00	81,375.00
Costs:					
Variable costs					
Fuel	gallons	6,485.88	3,665.48	1,940.40	6,558.75
Oil	quarts	122.38	85.02	28.50	135.68
Oil Change	frequency	7.11	104.57	41.27	170.00
Bait (fish)	pounds	12,723.88	2,678.06	(3) 0.00	10,020.00
Cowhide	pounds	1,703.62	785.41	(5) 0.00	4,554,00
Ice	pounds	7,912.50	72.88	(7) 0.00	583.00
Crew wages	number	0.87	8,314.04	(3) 0.00	18,000.00
Gloves	pairs	162.88	226.53	72.00	510.00
Paint and brushes	number	19.13[a]	180.79	29.43	753.78
Scrub brushes	number	18.57	46.43	(1) 0.00	88.00
Boots, raingear and aprons	number	9.48[b]	62.48	32.92	114.66
Traps	number	427.00	4,250.38	2,700.00	6,000.00
Repair costs					
Hull		1.07	368.61	(1) 0.00	1,095.00
Engine		1.82	330.68	(3) 0.00	1,000.00
CB		0.00	0.00	(8) 0.00	0.00
VHF		0.00	0.00	(8) 0.00	0.00
Fathometer		0.20	8.53	(6) 0.00	50.00
Loran		0.06	1.66	(7) 0.00	13.29
Puller		3.46	254.45	25.00	485.00
Traps		723.38	2,054.81	420.00	6,800.00
Total variable costs			23,490.79	12,526.25	33,308.68
Fixed costs					
Depreciation					
Hull		9.62	1,347.11	700.00	3,900.00
Engine		9.12	677.68	214.29	1,125.00
CB		1.38	79.36	(1) 0.00	200.00
VHF		2.00	28.90	(4) 0.00	88.60
Fathometer		4.38	89.86	(1) 0.00	175.00
Loran		0.38	18.46	(7) 0.00	147.67
Puller		9.62	110.69	65.85	171.43
License			50.00	50.00	50.00
Registration			23.12	12.50	35.00
Insurance			93.75	(7) 0.00	750.00
Dockage			0.00	(8) 0.00	0.00
Total fixed costs			2,518.93	1,424.36	4,594.75
Total costs			26,009.72	14,176.24	35,272.72
Net revenue			$13,715.28	$-2,354.72	$47,170.29

() Denotes number of firms with a 0 value.

[a]Average quantity includes 16.64 gallons of paint and 2.49 paint brushes.

[b]Average quantity includes 1.14 pairs of boots, 0.79 raingear and 7.55 aprons.

Table A5.--Costs and revenues analysis for Florida Keys spiny lobster fishermen with boats and vessels greater than 42 feet in length, 1978-79 season

	Quantity units	Average Quantity	Average Dollars	Range (dollars) Minimum	Range (dollars) Maximum
Returns:					
Spiny lobster	pounds	27,618.00	61,960.50	47,250.00	78,750.00
Costs:					
Variable costs					
Fuel	gallons	9,811.50	5,466.58	1,680.00	10,395.00
Oil	quarts	136.38	80.48	50.40	162.00
Oil Change	frequency	7.21	123.61	39.84	239.00
Bait	pounds	12,089.75	2,275.61	(3) 0.00	10,440.00
Cowhide	pounds	11,661.25	4,087.39	(4) 0.00	13,965.00
Ice	pounds	33,250.00	399.00	(6) 0.00	1,596.00
Crew wages	number	1.38	14,036.25	6,300.00	19,687.50
Gloves	pairs	184.06	242.47	126.29	448.00
Paint and brushes	number	12.20[a]	123.04	43.70	197.18
Scrub brushes	number	4.57	13.96	(3) 0.00	50.00
Boots, raingear and aprons	number	13.62[b]	79.85	37.85	113.00
Traps	number	640.00	6,945.65	3,001.44	10,887.50
Repair costs					
Hull		1.83	682.74	255.64	1,044.00
Engine		1.32	202.53	(4) 0.00	1,000.00
CB		0.00	0.00	(8) 0.00	0.00
VHF		0.00	0.00	(8) 0.00	0.00
Fathometer		0.54	38.87	(6) 0.00	300.00
Loran		0.00	0.00	(8) 0.00	0.00
Puller		1.89	103.44	(1) 0.00	310.00
Traps		1,018.75	2,554.69	750.00	7,200.00
Total variable costs			38,056.15	29,580.88	48,972.12
Fixed costs					
Depreciation					
Hull		9.88	2,135.02	780.10	3,714.29
Engine		6.75	2,057.03	725.00	5,666.67
CB		1.38	80.28	(1) 0.00	200.00
VHF		2.38	117.68	(3) 0.00	600.00
Fathometer		4.50	86.15	31.21	175.00
Loran		0.00	0.00	(8) 0.00	0.00
Puller		0.29	109.14	62.25	150.00
License			50.00	50.00	50.00
Registration			34.08	20.75	50.00
Insurance			0.00	(8) 0.00	0.00
Dockage			0.00	(8) 0.00	0.00
Total fixed costs			4,669.39	3,252.18	10,431.81
Total costs			42,725.53	33,126.51	52,846.06
Net revenue			$19,234.97	$2,699.00	$32,638.39

() Denotes number of firms with a 0 value.

[a]Average quantity includes 10.03 gallons of paint and 2.17 paint brushes.

[b]Average quantity includes 0.53 pairs of boots, 0.89 suits of raingear, and 12.20 aprons.

REFERENCES

[1] Cato, James C., Fred J. Prochaska and R. Allen Morris, Production, Costs and Earnings by Boat Size: Florida Spanish Mackerel Fishery. Florida Sea Grant Publication MAP-4, Gainesville: University of Florida, March 1978.

[2] Florida Department of Natural Resources. Summary of Florida Marine Landings, 1976, Division of Marine Resources, Tallahassee, Florida, 1976.

[3] National Marine Fisheries Service, Fisheries of the United States, 1979, Current Fishery Statistics No. 8000. U.S. Department of Commerce, Washington, D.C., April, 1980.

[4] Prochaska, Fred J., R. Allen Morris and James C. Cato. An Economic Analysis of King Mackerel Production by Hook-and-Line on the Florida Atlantic Coast, Florida Sea Grant Publication MAP-1. Gainesville: University of Florida, October 1977.

[5] Williams, Joel S. An Economic Analysis of Alternative Management Strategies for the Spiny Lobster Industry. Ph.D., Dissertation, Food and Resource Economics Department. University of Florida: Gainesville. December 1976.

Florida Sea Grant College is supported by award of the Office of Sea Grant, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, grant number 04-8-M01-76, under provisions of the National Sea Grant College and Programs Act of 1966. This information is published by the Marine Advisory Program which functions as a component of the University of Florida Cooperative Extension Service, John T. Woeste, dean, in conducting Cooperative Extension work in Agriculture, Home Economics, and Marine Sciences, State of Florida, U.S. Department of Agriculture, U.S. Department of Commerce, and Boards of County Commissioners, cooperating. Printed and distributed in furtherance of the Acts of Congress of May 8 and June 14, 1914. The Florida Sea Grant College is an Equal Employment Opportunity-Affirmative Action employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, or national origin.

Copies available from:

Marine Advisory Program
Florida Cooperative Extension Service
G022 McCarty Hall
University of Florida
Gainesville, FL 32611

This public document was promulgated at a cost of $608.68 or 30 cents per copy, to provide economic information on Florida's commercial fishing industry. Cost does not include postage and handling.