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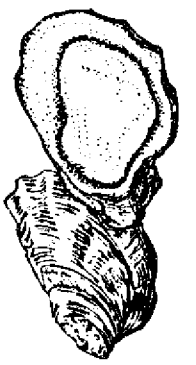

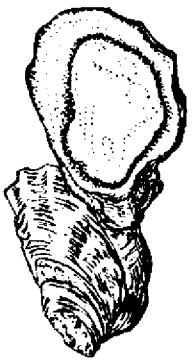

Production Costs and Revenues in the Florida Oyster Industry

By
Fred J. Prochaska
and
Walter R. Keithly, Jr.

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ECONOMIC AND FINANCIAL ANALYSIS OF PRODUCTION, COSTS AND REVENUES IN THE HARVESTING SECTOR OF THE FLORIDA OYSTER INDUSTRY

Fred J. Prochaska
Professor, Food and Resource Economics
University of Florida

and

Walter R. Keithly, Jr.
Former Research Associate, University of Florida
Currently with Coastal Fisheries Institute,
Center for Wetland Resources, LSU

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INTRODUCTION

The oyster industry is an important component of Florida's commercial fishing industry. During the 1980-84 period, oysters were the eighth most important species and accounted for 3.4 percent of total exvessel value of Florida commercial marine landings (NMFS). Oyster landings have trended upward from approximately 2.0 million pounds in 1960 to an average of approximately 6.0 million pounds annually during the 1980's, with a production peak of 7.3 million pounds in 1981 and a peak value of $7.5 million in 1984 (Table 1). The growth in the oyster industry was the same for the value of all landings. The relative importance was 3.4 percent of total exvessel value of all marine landings during 1960-64, the same as it was for the 1980-84 period.

The oyster industry is heavily concentrated in Apalachicola Bay on the coast of Franklin County in Northwest Florida where over 90 percent of total Florida oyster landings have occurred in recent years (Table 1). Franklin County currently ranks fourth in total Florida commercial marine landings. Within the county, oysters make up over one-third of the value of commercial marine landings.

In 1982 a conference on the Apalachicola oyster industry was held to review the industry and assess the need for research and other support activities (Andree, 1983). It was found that relatively little economic research had been conducted to quantify the financial condition of the oystermen and the industry in total. In response to this need, the Food and Resource Economics Department of the University of Florida initiated two studies. One study concentrated on the marketing and processing sector of the industry. Results of that study were published in 1985 (Prochaska and Keithly). The purpose of this report is to present results of a second study which concentrated on the harvesting sector of the oyster industry.

The purpose of this study was to collect information concerning the production practices and associated costs and revenues of the oystermen in Franklin County for the year starting September 1982 and ending in August 1983. This time period is appropriate for this study since it included both a fall and summer season and the season is generally conducted on a September through August basis. A total of twenty-five questionnaires were completed through personal interviews. These are the basis of the analysis presented in the following sections. While no statistical test was formally conducted to ascertain the appropriate sample size or stratification, sample size was based on similarity in production practices among those oystermen interviewed, and discussions with marine agents, port data agents and industry leaders. In order to assure a representative sample, oystermen working out of several fish houses in different areas of the county were interviewed. It is believed that the only potential source of sampling bias may come from nonsampling of the small number of oystermen who do not always sell directly to fish houses but rather sell directly to some other outlet. To the extent that little is known concerning the production practices of this group as compared to those selling directly to fish houses, the potential sampling bias resulting from the omission of this group is likewise unknown.

Table 1.-- Franklin County oyster landings compared to State of Florida oyster landings 1960-84.

Year	Franklin County		Florida		Franklin County Percent of State Pounds
	1,000 Lbs.	1,000 Dols.	1,000 Lbs.	1,000 Dols.	%
1960	1,745	436	1,975	496	88.34
1961	2,947	934	3,327	1,053	88.58
1962	4,367	1,245	5,020	1,427	86.99
1963	3,811	1,090	4,363	1,249	87.34
1964	2,252	630	2,885	809	78.07
1965	2,338	784	2,955	987	79.10
1966	3,810	1,171	4,292	1,343	88.77
1967	4,196	1,275	4,761	1,501	88.13
1968	4,826	1,543	5,569	1,854	86.65
1969	4,350	1,613	5,153	1,964	84.42
1970	3,044	1,229	3,787	1,594	80.39
1971	3,180	1,392	3,711	1,641	85.69
1972	2,981	1,360	3,357	1,582	88.79
1973	2,193	1,335	2,531	1,593	86.67
1974	2,454	1,371	2,751	1,609	89.20
1975	2,033	1,107	2,213	1,260	91.85
1976	2,503	1,591	2,714	1,779	92.24
1977	3,894	2,820	4,198	3,106	92.76
1978	5,566	4,223	5,974	4,607	93.18
1979	5,810	4,869	6,206	5,255	93.61
1980	6,410	5,739	6,853	6,177	93.53
1981	6,617	6,463	7,269	7,177	91.02
1982	4,153	4,150	4,899	4,945	84.75
1983	3,936	4,158	4,403	4,697	89.40
1984	6,198	6,803	6,721	7,495	92.22

Source: Florida Landings, NMFS, USDC. Washington, D.C.

The results of this survey are of use to diversified groups of individuals such as oystermen, lending institutions, and fishery managers. Oystermen can use the results to compare their production practices and associated revenues and costs with that of the industry average. Lending institutions can use the results as an additional factor in determining the appropriateness of making loans to oystermen for boats and/or motors. Finally, fishery managers can use the results presented in this study to determine the appropriateness of providing additional research and/or funding for the industry.

PRODUCTION CHARACTERISTICS AND PRACTICES

Average Characteristics

The capital equipment necessary for oyster harvesting is minimal and relatively inexpensive when compared to most other commercial fisheries in Florida. Essentially a small boat, an outboard motor, a cull board and culler, and a set of tongs are the only capital investments needed to harvest oysters. Findings of the survey indicated that the length of the standard oyster boat ranged from 20 to 27 feet, with approximately 90 percent of the observations falling within the 21 through 25 foot category and 68 percent between 21 and 23 feet in length. The average boat was 22.8 feet (Table 2). The average age of boats was 6.1 years with a range of 2 to 19 years. Present value of boats was relatively low and averaged $1,048 according to the owners interviewed.

The cull board is simply a piece of plywood placed toward the front of the boat and facilitiates the culling of oysters. Several oystermen indicated that they carried two pairs of tongs or handles (a twelve foot pair and a fourteen foot pair) to facilitate harvesting from waters of different depths.

Effort was measured in terms of number of trips made and time spent oystering on each trip (Table 2). The majority of oystermen harvested oysters year around. The average was 10.8 months per year with a range of 6 to 12 months. Sixty-eight percent worked 12 months per year. Throughout the year an average of 186 trips were made per oystermen. This represents approximately 17 trips per month fished. These monthly averages varied somewhat for certain periods of the year. Oystermen who harvested oysters year around indicated that they oystered somewhat less frequently in the summer and fall months due to time spent targeting other species (i.e. shrimp, blue crabs, and trout) and/or other work (i.e. oyster relaying, painting). The majority indicated that the warmer months were preferable to the colder months for oystering for two reasons. First, trips lost due to inclement weather are fewer in the warmer months. Second, oystermen at some of the fish houses indicated that limits placed on the oystermen's catch and/or trips by the dealer tended to be a more serious problem in the colder months due to weaker market conditions in the colder months. The weaker market conditions were likely due to increased supplies rather than reduced demand. Of those fishermen who used their oyster boats for fishing activities other than oystering, trips made for these species tended to be few and generally unprofitable according to the oystermen. No data were collected to analyze these secondary fisheries for these reasons. Income accruing to the oystermen from oystering as a percentage of total annual household income from all sources (oystering, other fisheries and

Table 2. -- Production characteristics of Florida oyster industry (Franklin County) 1982-83[a]

Item	Average	Range	
		Low	High
Boat:			
Size (feet)	22.8	20	27
Age (years)	6.1	2	19
Value(dols)	1,048	300	2,500
Engine:			
Horsepower	51.4	30	100
Value (dol.)	2,305	800	3,600
Gasoline (gal./day)	4.5	1	8
Effort:			
Running time (min./day)	54.0	10.0	95.0
Fishing time (hrs./day)	7.1	4.5	9.0
Months fished	10.8	6.0	12.0
Trips per year	186.0	72	312
Bushels landed:			
Annual average	2,206.78	1,060	4,680
Per trip	11.8	6	18

[a]Based on sample of 25 Franklin County oyster fishermen.

nonfishing) ranged from 30 to 100 percent, with 75 percent indicating that more than half of their annual income was derived from oystering.

Total trip length averaged 8 hours per oysterman. Total trip time is divided between running time and oystering time. On average about 7 hours are spent oystering and one hour is spent traveling to and from the oyster grounds. Running time and oystering time varied widely among the sample boats. Running time ranged from 10 minutes to 95 minutes. Running time on the average is higher for oystermen operating out of Apalachicola oyster houses than for those out of East Point oyster houses. Oystering time ranged from a low of 4.5 hours to 9 hours per day.

The time spent actually fishing depends to some extent on catch per hour and whether the oysterman has a partner. Approximately one third of the oystermen interviewed stated that they sometimes took a partner on the trip. This partner was almost always some relative and was usually the wife. This decreased the average duration of the trip for a given catch because it allowed the oysterman to spend more time oystering while the partner culled the legal sized oysters from the undersized oysters.

Production per season averaged 2,206.7 bushels and ranged from a low of 1,060 bushels to a high of 4,680 bushels (Table 2). This represents approximately 11.9 bushels per trip. Factors affecting bushels landed are analyzed in the following section.

Effort-Yield Functional Relationship

Effort-yield relationships quantify the relationship between fishing effort and yield on a continuous basis as the units of effort vary. Such relationships estimated with regression techniques specify the individual contribution of individual units of effort (or combination of effort units when the measurement units of effort are combined or aggregated into a single measure). Effort in oyster fishing may be measured in several ways: trips per designated period, hours fished in total or per trip, months fished, etc. Yield may be measured in units of bushels landed, gallons landed, etc.

In the present analyses variations in bushels landed annually by the 25 interviewed oystermen were best explained by two effort variables; hours harvesting oysters per trip (F) and number of trips per year (T). Two additional variables were included in the analysis to account for variations in landings and/or practices among oystermen. The underlying assumption of this model is that each fisherman individually attempts to maximize their expected output. The first variable, A, indicates the oystermen were operating out of Apalachicola oysterhouses rather than oysterhouses located in East Point. Differences in culling practices, distances from port to oyster beds, and marketing practices were hypothesized to affect yields between the two locations. The second variable, S, was included to distinguish between full time oystermen (12 months) and part-time oystermen who harvest less than 12 months per year. The difference in these two groups reflects oystering during the summer months. These four variables explained 72 percent of the variation in oyster yields among oystermen. Estimated coefficients and standard errors are presented in the following equation.

(1) $Q = e^{1.58}\, F^{.56}\, T^{.94}\, e^{-.11A}\, e^{.20S}$

(1.18)(.32)(.23) (.11) (.18)

Where:

Q = Annual number of 65 pound bushels (bags) landed per oysterman, 1982-83,
e = 2.718 (Logrithmatic base used in estimation process)
F = Hours actually harvesting oysters per trip,
T = Number of trips per year per oystermen,
A = One if oystermen originated from Apalachicola oysterhouses and
A = 0 if from East Point
S = One if full time oysterman (12 months per year) and
S = 0 if not full time oystermen,
() = indicates standard errors

Interpretation of the effort yield equation is facilitated with the use of Figures 1 and 2. Four oyster yield (landings) functions were derived (Figure 1). Oyster landings are related to trips per year (T). The estimated coefficient for T, .94, indicates a 1.0 percent increase (decrease) in trips will result in .94 percent increase (decrease) in landings, holding all other variables constant. This nearly one-to-one relationship is reflected in the nearly linear effort-yield relationships shown in Figure 1. The difference in yield functions A and B reflects different yields expected from oystermen in Apalachicola than from those in East Point when both oyster 12 months for the year and are alike in other effort units. The Apalachicola oystermen's landings are 90 percent of those landed by identical East Point oystermen. The same point with respect to area differences is shown by comparing yield functions C and D for fishermen who do not operate 12 months (no summer oystering) a year. A comparison of yield functions A and C and/or functions B and D show the effect of summertime oystering. Those oystermen working during the summer (and therefore 12 months a year) landed 22 percent more oysters than those landed by oystermen who do not, given other effort variables equal.

Additional yield functions were derived as a function of hours spent oystering per trip for an average of 186 trips per year (Figure 2). An increase of 1.0 percent in oystering time per trip results in an increase in oyster yields of .56 percent. The functions in Figure 2 reflect the total annual increase if the percentage increase per trip is applied to the mean number of trips per year (186). Comparisons of yield functions A,B,C and D are the same as the comparisons made with respect to Figure 1: Apalachicola oystermen land 90 percent of landings per oystermen in East Point and oystermen who work throughout the year (includes summer months) land 22 percent more that those not oystering the summer months.

One further illustration is possible. Figure 1 was constructed for the average firm oystering 7.1 hours per day and Figure 2 was constructed for oystermen averaging 186 trips per year. Given the positive effects of both variables all functions in Figures 1 and 2 would have shifted upward (downward) for more (less) hours harvesting per day, and for more (less) trips per year. The amount of the shifts is indicated by the coefficient

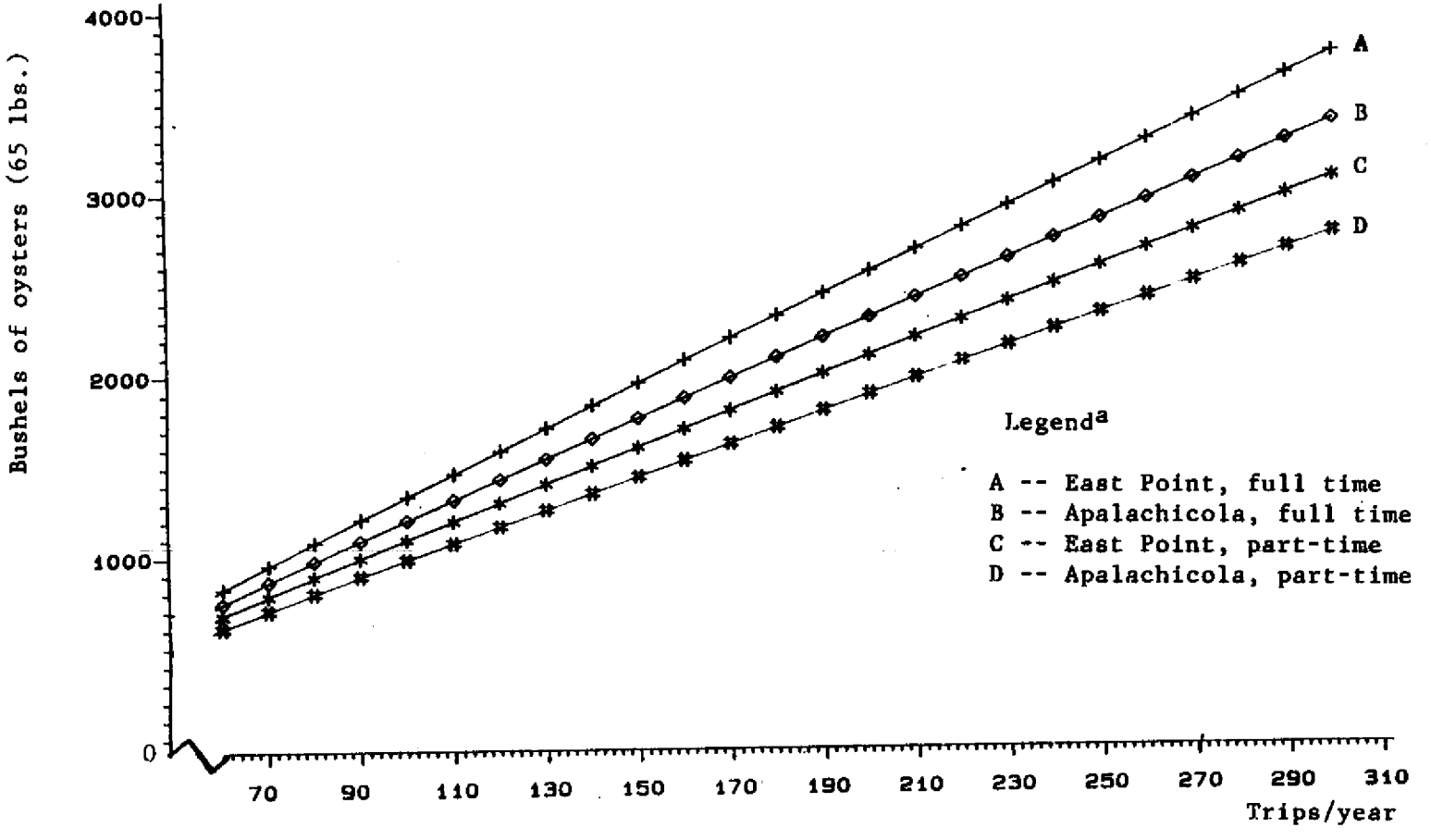

Figure 1. Oyster yields as a function of trips per year, area fished, and full and part-time status.

[a]East Point and Apalachicola refer to port areas of Franklin County, Florida. Full time and part-time refer to 12 months and less fishing time, respectively. Hours fished are at the mean level of 7.1 hours/day.

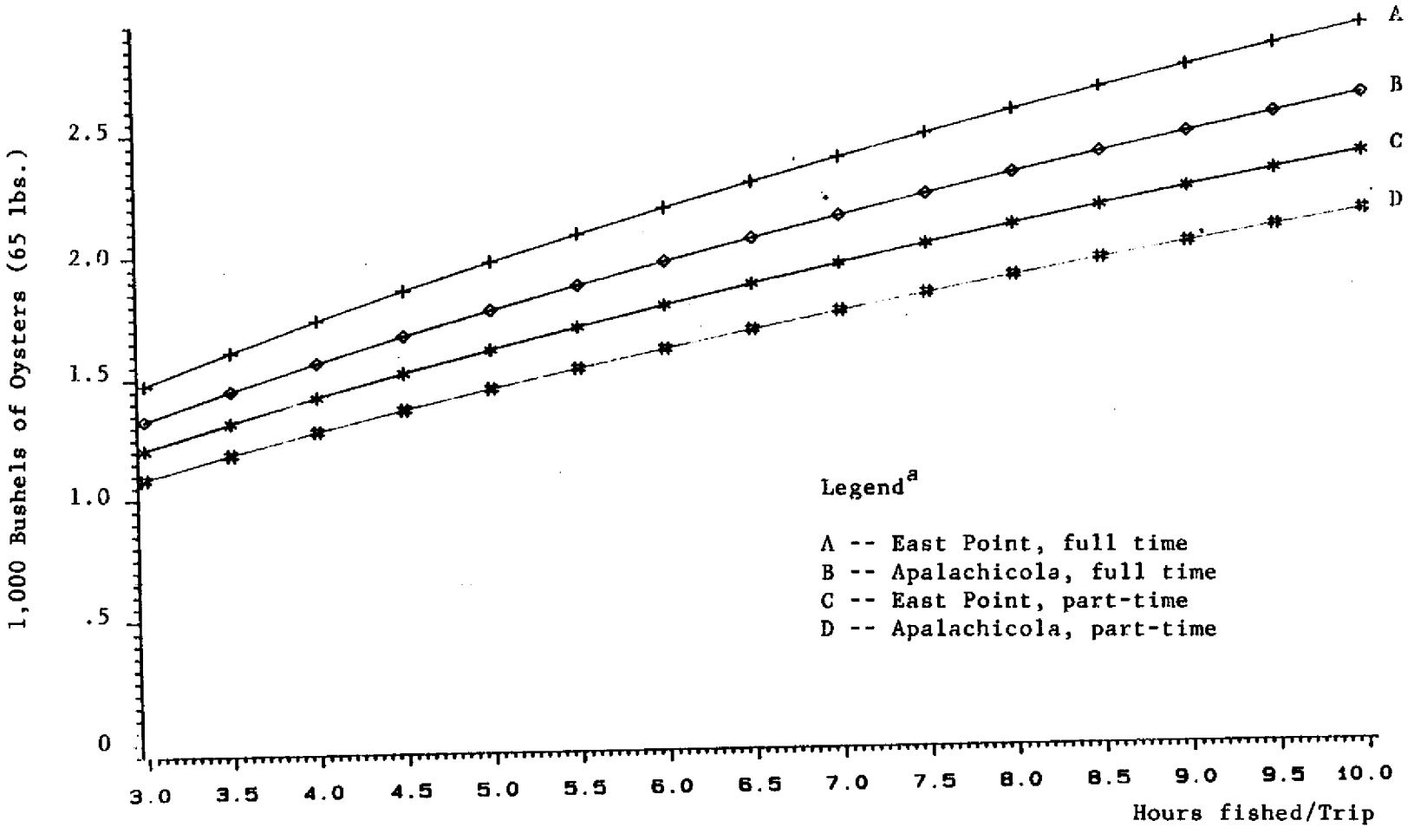

Figure 2--Oyster yields as a function of hours fished per trip (186 trips), area fished and full and part time status.

[a]East Point and Apalachicola refer to port areas of Franklin County, Florida. Full time and part-time refer to 12 months and less fishing time, respectively. Trip fished per year are held at the mean level of 186 trips.

.94 for trips (T) and .56 for hours fished (F) and by the positive slopes of all functions in Figures 1 and 2.

REVENUE AND COSTS

Revenues earned and costs incurred from oyster fishing are presented in this section. Major attention is given to analysis of annual totals incurred by the average fishermen. Budgets were also developed on a per trip basis and a per bushel basis and are presented in the Appendix. Such breakdowns of the data are useful for analysis of private and public decisions. Current examples are the restrictions on bushels landed per day due to the 1985 hurricanes and restrictions on days spent oystering as seasonal and area closures affect number of trips made. The Appendix also includes separate budgets for East Point and Apalachicola fishermen.

Revenues

Gross or total revenue earned per oysterman averaged $11,706.08 (Table 3). Revenue from individual oyster enterprises ranged from a low of $4,320 to a high of $24,750. This was based on average landings of approximately 2,206 bushels (65 pound bags) presented in Table 2 and a weighted average price of approximately $5.30 per bushel (Appendix Table A). Prices ranged from $4.00 to $6.00 per bushel depending mainly on size of oysters and whether they were singles. The wide range in annual revenues obviously depends on the variation in prices and the variation in landings caused by factors discussed in the previous section. On a per trip basis revenues averaged $62.96 and ranged from $28.50 to $99.00 (Appendix Table B). No statistical difference (using analysis of variance) was found between gross revenues produced by East Point and Apalachicola oystermen. This is primarily because slightly higher landings in East Point were offset by lower prices per bushel (Appendix Table C). Prices per bushel were lower due mainly to landings of smaller oysters and less in the select grade.

Variable Costs

Variable costs are those costs which vary with the amount of oyster harvesting effort. Variable cost items for oystering are boat and engine repairs, gloves, boots, tongs, fuel and oil (Table 3). Fuel and oil were the largest individual cost items. For the 25 oystermen interviewed the 1982-83 season average costs equaled $1,161.69 with a range from $230 to $1,987. Fuel and oil amounted to 10 percent of the selling price of a bushel of oysters and approximately 10 percent of daily revenues (Appendix Tables A and B). Annual fuel costs per boat varied for two reasons; first, trips per boat varied and second, fuel usage per trip varied. Fuel usage per trip varied from a low of one gallon per trip to a high of eight gallons per trip, largely as a result of the horsepower of the motor and proximity of the fish house to area fished. Closely associated with the fuel costs was the cost of oil since outboard motors require a fixed ratio of oil per gallon of gasoline.

Gloves and boots were the second most important variable cost items at an average of $370.92 per season (Table 3). The wide variation in these costs were directly associated with the amount of oysters handled. Tong costs also varied directly with the amount of oystering. The average

Table 3 . Annual cost and revenue, Franklin County oyster industry, 1982-83[a].

	Average	Range[b] Low	High
	----------dollars----------		
Gross revenue	11,706.08	4,320	24,750
Variable costs:			
Boat repairs	225.96	88	428
Eng. repairs	282.24	10	1,270
Gloves & boots	370.92	97	798
Tongs	162.20	58	310
Fuel & oil	1,161.69	230	1,987
Total	2,203.01		
Fixed costs:			
Boat depreciation	138.80	42	367
Engine depreciation	663.64	267	1,167
License & permits	19.28	17.50	37.50
Total	821.72		
Total costs	3,024.73		
Net revenue:			
Over variable costs	9,503.07		
Over total costs	8,681.35		

[a]Based on a sample of 25 Franklin County oyster fishermen.

[b]Range data generally represent different firms for many of the individual entries and therefore total and net values should not be calculated.

seasonal tong cost was $162.20. This cost varied between oystermen in that for some oystermen it included replacement costs while for others it represented repair costs (such as for welding).

Boat and engine repairs averaged $508.20 per season per oysterman (Table 3). These costs varied widely between individuals on a seasonal basis and varied with respect to specific items repaired such as props, water pumps, etc. Repairs or replacement of culling boards were included with boat repairs.

Total variable costs averaged $2,203.01 for the 1982-83 season. This amounts to $1.00 per bushel and $11.86 per trip (Appendix Tables A and B). These costs amounted to 73 percent of total cost and 19 percent of total revenues earned.

Fixed Costs

Fixed costs include licenses, permits and depreciation on boat and engine. Straight line depreciation was assumed and was based on current value, expected life and zero salvage value.

Engine depreciation was the largest fixed cost item with a reported 1982-83 average of $663.64 per fisherman (Table 3). This cost varied from a low of $267 to a high of $1,167 for individual oysterman. The average remaining life of engines at the time of the survey was 3.4 years with a range of 1.5 to 6.0 years (other engine and boat characteristics are presented in Table 2). Boat depreciation averaged $138.80 per oysterman. The average expected remaining life of these boats was 10 years.

The remaining fixed cost items included in Table 3 are for boat registration and permits. These costs averaged $19.28 per oysterman. Florida commercial boat registrations were $12.50, $17.50 or $27.50 depending on length. Permits were $5.00 per person including crew members. Since the survey an additional $25.00 commercial license has been imposed for commercial seafood sales.

Other possible cost items were insurance, dockage and interest. These are not reported because very few oystermen incurred these costs. Only 5 oystermen had insurance and interest costs. These were all for motors that were financed. Only one oysterman paid dockage fees ($5.00 per month).

Total Costs and Net Revenues

Total fixed costs averaged $821.72 per oysterman (Table 3). Total costs were $3,024.73. Fixed costs represented 27 percent of total costs while the remaining 73 percent were variable costs.

Net revenues to oyster fishermen averaged $9,503.07 above variable costs and $8,681.35 above total costs. This represents returns to the oysterman's labor, managerial skills, opportunity costs on his investments, and labor of the wives who served as unpaid crew members. Net returns on a per trip basis were $46.68 and $3.93 per bushel (Appendix Tables A and B).

SUMMARY AND CONCLUSIONS

Over 90 percent of Florida oyster landings occur in Franklin County. A personal survey of oystermen was taken for the 1982-83 production period. The average oysterman landed 2,206 bushels per season with a boat of 23 feet in length powered by an outboard engine slightly over 50 horsepower. Principle factors affecting landings were number of trips per year and hours fished per day. East Point oystermen tended to have higher production levels than oystermen fishing from Apalachicola fish houses. Oystermen from both areas who operated during the summer months had higher yields.

Total revenues from oystering averaged $11,706 during the 1982-83 season. Fuel and oil were the largest variable cost item while engine depreciation accounted for over 75 percent of fixed costs. Net revenues over total cost averaged $8,681.

Net revenue and total revenue estimates presented in this report are likely to be conservative. This is because 1982 and 1983 landings per fisherman were approximately only two thirds of 1978-81 and 1984 landings based on aggregate annual county statistics. If all additional landings were accomplished through additional trips, net returns per trip above variable costs should however, be representative of the 1982-83 production season. This is because fuel and oil were the major variable cost item and prices of these inputs did not increase substantially while oyster prices increased slightly from $1.07 to $1.12 per pound of oyster meats between 1983 and 1984. This situation would increase annual variable costs but also annual net revenue. Additional landings per trip would, however, increase net revenues per trip and per year since very little additional expenses per trip would be involved (fuel and oil are mainly consumed in travel time). Personal communications with industry representatives suggest increased production occurred for both reasons and thus total revenues most likely increased more than total costs in 1984. However, it should also be noted that oystermen in the survey represented essentially full-time fishermen while published county time series statistics include part-time fishermen. The fishermen in the survey averaged landing 2,206 bushels which would be approximately 551 Florida barrels at an assumed 4 bushels per barrel. During 1983 approximately 2.5 gallons were shucked per barrel (the yield varies considerably by month and year). Using the U.S. standard of 8.75 pounds per gallon, each survey oysterman produced 12,064 pounds of oyster meats. This compares with an industry average from the county statistics for all fishermen of approximately 6,245 pounds during 1982-83 and 9,419 pounds during 1984. Care should be taken when projecting from the survey data to industry averages which also include part-time oystermen.

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APPENDIX

Appendix Table A. Revenue and costs per bushel (65 pound bag), Franklin County oyster industry, 1982-83[a]

	Average	Range[b]	
		Low	High
	dollars		
Gross revenue	5.30	4.00	6.00
Variable costs:			
Boat repairs	.10	.04	.29
Eng. repairs	.13	.01	1.02
Gloves & boots	.17	.07	.38
Tongs	.07	.01	.24
Fuel & oil	.53	.16	1.58
Total	1.00		
Fixed costs:			
Boat depreciation	.06	.01	.34
Engine depreciation	.30	.09	.88
License & permits	.01	00[c]	.02
Total	.37		
Total costs	1.37		
Net revenues:			
Over variable costs	4.30		
Over total costs	3.93		

[a]Based on a sample of 25 Franklin County oyster fishermen.

[b]Range data generally represent different firms for many of the individual entries and therefore total and net values should not be calculated.

[c]less than one cent per bushel.

Appendix Table B. Revenue and costs per trip, Franklin County oyster industry 1982-83[a].

		Range[b]	
	Average	Low	High
	----------dollars----------		
Gross revenue	62.96	28.50	99.00
Variable costs:			
Boat repairs	1.22	.42	2.88
Eng. repairs	1.52	.06	8.14
Gloves & boots	2.00	.67	4.14
Tongs	.87	.57	3.10
Fuel & oil	6.25	1.80	12.00
Total	11.86		
Fixed costs:			
Boat depreciation	.75	.24	5.10
Engine depreciation	3.57	.86	12.96
License & permits	.10	.05	.31
Total	4.42		
Total costs	16.28		
Net revenues:			
Over variable costs	51.10		
Over total costs	46.68		

[a]Based on a sample of 25 Franklin County oyster fishermen.

[b]Range data generally represent different firms for many of the individual entries and therefore total and net values should not be calculated.

Appendix Table C. Costs and revenue, East Point and Apalachicola, Franklin County oyster industry[a].

	Per boat		Per trip		Per bushel	
	E.P.	Apal.	E.P	Apal.	E.P.	Apal.
Gross revenue	11,985.17	11,448.50	61.89	64.04	5.05	5.57
Bushels landed	2,371.67	2,054.38	12.25	11.49	1	1
Variable costs:						
Boat repairs	248.00	205.62	1.28	1.15	.10	.10
Engine repairs	283.25	281.31	1.46	1.57	.12	.14
Gloves & boots	440.25	306.92	2.27	1.72	.19	.15
Tongs	199.83	127.46	1.03	.71	.08	.06
Fuel & oil	1,019.81	1,292.65	5.27	7.23	.43	.63
Total	2,191.14	2,213.96	11.31	12.38	.92	1.08
Fixed costs:						
Boat depreciation	155.08	123.77	.80	.69	.07	.06
Engine depreciation	580.75	740.15	3.00	4.14	.24	.36
License & permits	19.92	18.69	.10	.10	.01	.01
Total	755.75	882.61	3.90	4.93	.32	.43
Total costs	2,946.89	3,096.57	15.21	17.31	1.24	1.51
Net revenue:						
Over variable costs	9,794.03	9,234.54	50.58	51.66	4.13	4.49
Over total costs	9,038.28	8,351.93	46.68	46.73	3.81	4.06

[a] Based on a sample of 25 Franklin County oyster fishermen.