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Economics of Gulf of Mexico Industrial and Foodfish Trawlers

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ABSTRACT—Presented here are results of a study undertaken in 1973 on economic data of costs and production of the groundfish and foodfish trawling industry in the northern Gulf of Mexico. The need for these data stems from the increased fishing pressure on the northern Gulf groundfish stocks and the apparent interest to utilize these groundfish more effectively. Examples of this are: 1) the use of the incidental catch (which is now discarded) by the shrimp fleet for manufacture of fish meal and petfood, 2) processing sciaenids (especially croaker) into minced fish products. Income projections are shown for optimum vessels of the foodfish and industrial trawl fishery, including operating costs, catch rate and composition, and income projections based on present and past catch data. The data presented can be applied to the operation of vessels used in such fisheries as shrimp trawling or snapper; consequently, they may be of value to vessel owners in determining their own economic projections.

INTRODUCTION

In recent years, the groundfish stocks of the northern Gulf of Mexico have gained considerably in importance as a source of foodfish and as a source for industrial uses. Indications are that because of the increased importance, harvest of these stocks will increase at a faster rate than it has in the past. The decline of the anchoveta fishery in Peru in 1972 and its complete closure in 1973 has greatly contributed to the search for other sources for fish meal. Similarly, the use of small fish, particularly sciaenids (croaker), for processing into specialty foods such as minced fish portions has increased importance of the groundfish stocks of the northern Gulf of Mexico. This will spur the development of the fishing fleets through new construction and through periodic transfer from other fisheries, such as from the shrimp fleet. (At present these fisheries are mutually exclusive.)

Increased pressure on the resources is evident now, as a result of greater shrimping efforts. The higher prices paid for shrimp and the increased operating costs of the larger and more expensive shrimp trawlers have contributed to this situation. The vessels fish longer than in the past and operate in marginal production areas, i.e., in areas where the ratio of shrimp to fish is considerably lower than 1 to 10. The result is a substantial increase over previous years in the incidental fish catch.

Anticipating the need for basic information on the economics of the trawl fishery, we compiled data on the operation of vessels which fish exclusively for industrial fish and shrimp vessels which operate intermittently in taking groundfish for human consumption, hereinafter called foodfish. Information on the latter projects the operation of a "shrimp" vessel engaged in foodfish trawling for an entire year.

Although the economic data presented may not apply specifically to an existing fishery development scheme, they could serve as a guideline in projecting or deciding on a course of action. Reference is made to existing fishery development because it is felt that the eventual goal or outcome in making use of the Gulf groundfish resources is an effective total utilization concept. An example of this is making use of the fish harvested according to their relative economic value—e.g., foodfish, petfood, and fish meal. Owing to the many alternatives (and unknowns), to make predictions relative to the total utilization concept at this time would not be feasible. An example of these alternatives is the potential use of small croaker (*Micropogon undulatus*) for processing into "surimi." Surimi is composed of shredded fish flesh, sugar, and preservatives, and is used in Japan for manufacture into a variety of food products. The best surimi is produced from sciaenid fishes, especially croaker.

It is intended that vessel operating costs and catch projections may assist vessel operators in making their own fishery economics evaluation.

DISCUSSION AND RESULTS

Information on the economics is projected from data gathered from vessel operators, processing plants, Government agencies, and historical records (Roithmayr, 1965). The optimum vessel information is based on annual average current operating costs of the top producers. On this, the following topics are discussed:

1. Vessel characteristics, size, capacity, and type;
2. Optimum level of fishing effort;
3. Catch rate and composition;
4. Economic data of optimum vessels;
5. Income projection of present fleet activities.

Foodfish Fleet

1. Vessel Characteristics—Size, Capacity, Type

The foodfish fleet is composed of approximately 40 vessels; however, these generally operate only part-time. During the summer many engage in shrimping, returning to the food fishery in the fall when the shrimp catch declines.

The vessels are typical double-rigged shrimp trawlers, ranging in size from 65 to 85 feet LOA with an average of 78 feet. Their carrying capacity is from 52 to 100 tons, averaging 80. Horsepower ranges from 240 to 425, averaging 350. Net sizes are from 50 to 70 feet, averaging 62. Trawl door dimensions vary between 9 feet × 40 inches and 12 feet × 44 inches, averaging 10 feet × 44 inches. The optimum vessel is considered to

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be 80 feet long, with a capacity of 80 tons, has a 350 horsepower engine, and uses two 65 foot nets and 10 foot × 44 inch doors (Gutherz, et al., in press). In this paper the term optimum refers to the economic achievement of an above-average fishing vessel. At least one-fourth of the fishing vessels of the industrial and foodfish fleets fall in this category.

2. Level of Fishing Effort

Currently, the foodfish vessels fish an average of 13 hours per day, daytime only. Normally, four tows are made per day depending on the catch rates.

Under the present fishing strategy, an optimum foodfish vessel could make 33 trips per year without reverting to shrimping. The average trip is 6½ days; 5 days are spent fishing and 1½ days running. The trips may be as short as 3 days or as long as 12. Based on 33 trips per year, 5 days per trip, and 13 hours per day fishing, the annual total is 2,145 hours of fishing effort.

3. Catch Rate and Composition

The estimated average catch, composition, and rate per hour were calculated from records supplied by three top ranking (highliners) foodfish vessels covering several months' fishing activity during 1970-72. These follow:

Average Catch Rates				
Marketable foodfish (60%)				
Croaker	328	lb/hr		
Other finfish	22½	lb/hr		
Shrimp (heads on)	7½	lb/hr		
SUBTOTAL			358	lb/hr
Discards (40%)				
Croaker* (Surimi & smaller)	122	lb/hr		
Trash	121	lb/hr		
SUBTOTAL			243	lb/hr
TOTAL			601	lb/hr

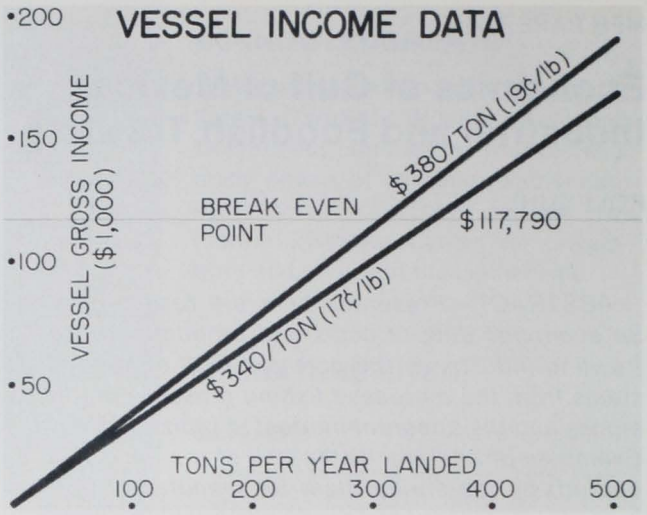
*Surimi size croaker range from 3 to 7 oz each

Projecting the figures for an entire year's operation, the following totals are derived:

Projected annual production		
Marketable foodfish		
Croaker	703,560 lb	
Other finfish	48,262 lb	
Shrimp (heads on)	16,088 lb	
SUBTOTAL		767,910 lb
Discards		
Croaker (Surimi & smaller)	261,690 lb	
Trash	259,545 lb	
SUBTOTAL		521,235 lb
TOTAL		1,289, 145 lb

From the above figures, 20% of the total catch is composed of surimi size and smaller croakers and 20% sharks, skates, rays, etc., which are now discarded.

Figure 1.—Data based on optimum foodfish vessel economics: 33 trips per year, 2,150 fishing hours and fixed owner's expense. Note that the chart applies only to the gross income and expense of the vessel, not the crew.



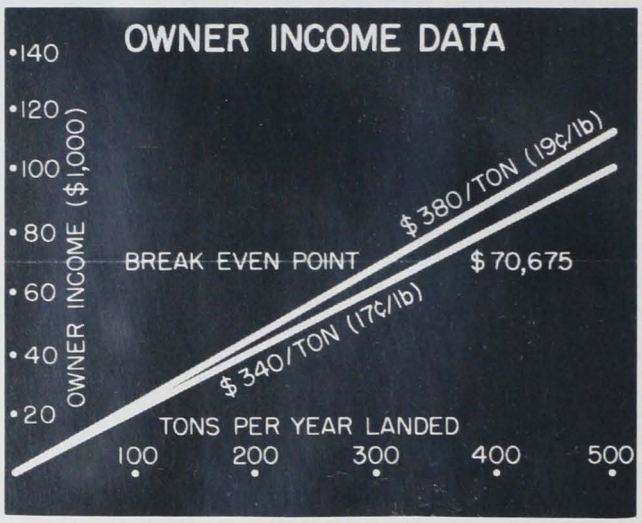


Figure 2.—Data based on optimum foodfish vessel economics: Operating costs of 33 trips (3,760 hours) per year as shown in text.

4. Economic Data of Optimum Vessel

The operating costs per year are based on 33 trips, the equivalent of 3,760 hours of which 5 days (2,145 hours) per trip are spent fishing and 1½ days (1,615 hours) running.

Annual operating expenses (rounded)	
1. Fuel, 3,760 hours at 25 gal/hr at 32¢/gal	$30,080
2. Lubricants, 260 gal at $1.25/gal	325
3. Galley supplies $5.00/day/man (3 men)	3,215
4. Repair & maintenance (haulout, etc.)	1,000
5. Spare parts & supplies, engine (filters, etc.)	300
6. Engine & Equipment repair & maintenance	2,500
7. Fishing gear repair and replacement	
(a) Nets—2½ nets per year	3,500
(b) Doors—2 sets per year	800
(c) Twine, webbing, chaffing gear	400
(d) Cable—400 fms every 2 yr at 24¢/ft	290
(e) Blocks, lines	300
8. Deck supplies and material	350
9. Administrative expenses	600
10. Repayment of principal on 75% of $150,000 or $112,500 for 10 yr	11,250
11. Interest payment, 10 yr at 8-½%	4,775
12. Amortization of $37,500 (10%)	3,750
13. Insurance, hull, and P&I (3-½% & $1,500)	5,700
14. Ice, 40 tons per trip at $9.85/ton	13,000
15. Contingency	3,000
TOTAL	$82,135

NOTE: Of the above total, Items 3, 7, and 14 are deducted from the crew's share on the following basis:

3. Galley supplies (total paid by crew)	$ 3,215
7a. Nets (Cost of labor paid by crew, ½ of total)	1,750
14. Ice (Crew pays ½ the cost)	6,500
	$11,460

5. Income Projection of Present Fleet Activities

This projection reflects the estimated annual operation of an optimum foodfish vessel calculated from the catch and cost data shown previously. Prices shown are ex-vessel, current as of May 1974.

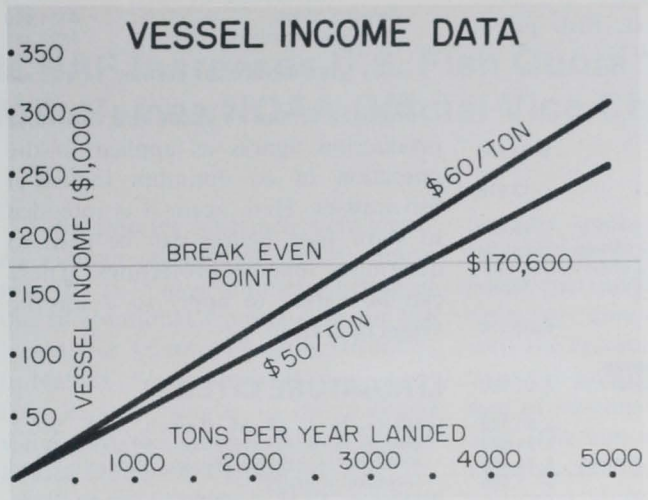


Figure 3.—Data based on optimum industrial fish trawler economics: 40 trips per year, 2,600 fishing hours and fixed owner's expense.

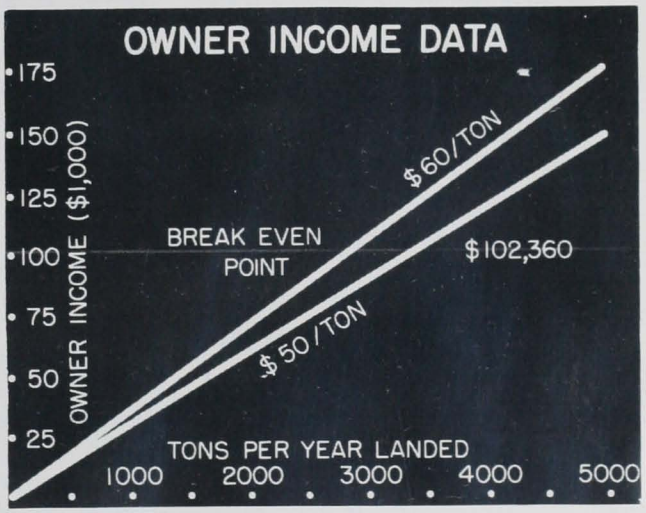


Figure 4.—Data based on optimum industrial fish trawler economics: 40 trips per year, 2,600 fishing hours, owner's expenses, and income projection.

Projected income (based on actual production)

Marketable foodfish (totals rounded)		
Croaker*	784,000 lb	
Large	25% at 22¢/lb	$ 43,000
Medium	40% at 18¢/lb	56,500
Small	35% at 7¢/lb	19,200
*Includes 30% or 80,470 lb of small croaker that used to be discarded but is now marketable.		
Other finfish	48,000 lb at 20¢	9,600
Shrimp	16,000 lb at 85¢/lb (21-25 count heads on)	13,950
TOTAL INCOME		$142,250
Normal split: 40% for crew		$ 56,900
60% for owner		$ 85,350
Total annual expenses		$ 82,135
Less crew's expenses		$ 11,460
Owner's expenses		$ 70,675
Crew's share (total crew: 3 men)		$ 56,900
Less deductions (expenses)		$ 11,460
Net crew's income		$ 45,440
Owner's share (or boat share)		$ 85,350
Less expenses		$ 70,675
Net owner's income (or boat share)		$ 14,675

Applying the cost and production figures to vessel operation for 1 year, graphs can be prepared to show income projections at various levels of production, prices paid for fish, hours fished, etc. An owner can use the figures applicable to his vessel to determine levels of income under varying conditions. Figures 1 and 2 show graphs on the income and catch figures of an optimum foodfish vessel.

Industrial Fish Fleet

1. Vessel Characteristics, Size, Capacity, Type

The industrial fish fleet consists of only 15 vessels; however, they are larger than the foodfish counterparts and fish exclusively for industrial type fish.

The overall length and carrying capacity varies from 80 feet to 121 feet and 72 to 300 tons, averaging 94 feet and 138 tons.

Main engine horsepower ranges from 350 to 1,000, averaging 546. Net size (corkline length) varies from 52 feet to 100 feet; the mean is 84 feet. Trawl doors range from 10 feet × 50 inches to 15 feet × 72 inches, averaging 12 feet × 60 inches. In this fleet, the optimum vessel characteristics are estimated to be 90 feet LOA, 150-ton capacity, 600 horsepower, 82 foot net and 12 foot × 60 inch doors.

2. Level of Fishing Effort

The industrial fish vessels engage in fishing activities an average of 14½ hours per 24-hour day. Generally, four to five tows are made per day, depending on the catch rate. From information gathered from the existing fleet, an optimum vessel makes at least 40 trips per year. The average duration of each trip is 6 days, 4½ days fishing and 1½ days running to and from port. Based on these figures, the annual total fishing effort would be 2,600 hr. The length of the trips ranges from 2 days to a maximum of 8 days, not including broken trips caused by eventualities.

3. Catch Rate and Composition

Applying catch data from production records covering several years (1968-72) of four industrial vessels, the production potential per hour and partial catch composition for an optimum vessel are projected as follows:

Fish for industrial processing	3,120 lb
Foodfish (2%)	62 lb
Shrimp	8 lb
TOTAL	3,190 lb

NOTE: Foodfish and shrimp are removed by plant personnel and vessel crew as the catch is conveyed in for processing

Projecting these figures for a full year's operation will produce the following totals:

Fish for industrial use 3,120 × 2,600 hr	8,112,000 lb
Foodfish (2%)	162,200 lb
Shrimp 8 × 2,600 hr	20,800 lb
TOTAL	8,294,000 lb

4. Economic Data of Optimum Vessel

Operating costs per year based on 40 trips, the equivalent of 4,040 hrs (2,600 hrs fishing and 1,440 hrs running) in which 4½ days per trip are spent fishing and 1½ days running:

Annual operating expenses

1. Fuel, 4,040 hr at 35 gal/hr at 32¢/gal	$ 45,248
2. Lubricants, 550 gal at $1.25/gal	688
3. Galley supplies, $5.50/day/man (3-man crew)	3,960

4. Repair & maintenance (haulout, etc.)	3,500
5. Spare parts & supplies, engine (filters, etc.)	400
6. Refrigeration & power plant or drive maintenance	350
7. Fishing gear repair & replacement	
(a) Nets—2½ nets per year	4,500
(b) Doors—2 sets per year	1,200
(c) Twine, webbing, chaffing gear, etc.	350
(d) Cable 400 fm every 2 yr at 37.5¢/ft	450
(e) Blocks, lines	350
8. Deck working supplies & materials	275
9. Administrative expenses	600
10. Repayment of principal on 75% or $250,000 for 10 yr ($187,500)	18,750
11. Interest payment, 10 yr at 8-½%	7,950
12. Amortization of $62,500	6,250
13. Insurance, hull, & P & I (3½% & $1,500)	8,500
14. Contingency	3,000
TOTAL	$106,321

NOTE: Item 3, Galley supplies, is deducted from the crew's share. The owner pays the balance.

$106,321	
Less Item 3	3,960
Owner's expense	$102,361

5. Income Projection, Present Fleet Activities

The following is a projected estimate of the economics of an industrial fishing vessel operation for 1 year. The costs and production figures are taken from the foregoing text. Fish prices are current as of May 1974.

Projected income

Industrial fish production, 8,112,000 lb = 4,056 tons at $50/ton	$202,800
Foodfish 162,200 lb at 8¢/lb	12,976
Shrimp (heads on) 20,800 lb at 50¢/lb*	10,400
TOTAL INCOME	$226,176

*Owing to inferior quality of shrimp landed by industrial trawlers the selling price is less than for foodfish trawler caught shrimp.

Breakdown of income & expenses

Income from sale of industrial fish	$202,800
Normal split:	
40% for crew	$ 81,120
60% for owner	$121,680
Crew's share (Total crew: 3 men)	$ 81,120
Less deductions	$ 3,960
SUBTOTAL	$ 77,160
Plus income foodfish	$ 12,976
Plus income shrimp	$ 10,400
NET INCOME OF CREW	$100,536
Owner's share	$121,680
Less expenses	$102,361
NET INCOME OF OWNER	$ 19,319

Figures 3 and 4 show the cost and production figures as applied to the operation of an optimum industrial fish trawler. Here again it is intended to show how figures can be used to determine income projections. These can be varied to apply to a specific vessel operation.

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