NEW ENGLAND TRAWLERMEN STRUGGLE TO SURVIVE

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The drastic decline in the catch of food fish (shellfish excluded) by New England fishermen over the past 10 years is causing concern about the future of this fishery. (See appendix table 1 and figure 1.) The quantities of food fish landed in 1970 and 1971 dropped 46% from 1962 and 1963 figures. During this period, the continuing high demand for a dwindling supply boosted prices at the exvessel (dockside) level 97.6%. The result was a value increase (in current dollars) of 6.8% to fishermen. However, expressed in real dollars adjusted for inflation, the value of landings decreased 18%. The majority of these landings (80% by quantity, 89% by value) are made by vessels fishing with otter trawls for groundfish. Main species are cod, cusk, flounders (six species), haddock, hakes (silver and white), ocean perch, and pollock.

Fleet & Crew

This New England trawler fleet is composed of small units: the average vessel is 70 gross tons. The number of trawlers decreased 3% over the past 10 years; the number of fishermen on these vessels decreased 17%. Of the major species, only cod landings increased in the past decade (25.1%). Landings of flounders (the whole group of six species) remained the same. All other major species declined: haddock, 82.2%; silver hake, 63.1%; ocean perch, 50.4%; pollock, 36.8%.

On the resource side, recent biological studies (ICNAF, 1970) indicated that the condition of the Georges Bank haddock stocks had become extremely serious. The 1963 year-class was the last substantial one. It was followed by 7 successive weak year-classes. Haddock stocks are expected to remain very seriously reduced at least until 1973. A study by Robert Edwards in 1968 showed that catch/tow decreased from 1964 through 1967: for haddock, 61.4%; silver hake, 40%; red hake, 71.4%; yellowtail flounder, 13.6%; and all other groundfish, 25.5%. The overall abundance of species taken by otter trawl dropped 40% between 1964 and 1967.

Other problems confront the New England trawlermen. These will be discussed on the following pages.

The sharp drop in landings by the otter trawler fleet has caused much economic hardship. The purpose of this article is to analyze the current economic situation of vessel owners and fishermen. Since about two-thirds of the New England trawler fleet operated from Massachusetts ports (as of 1967-1968), the economic analysis has been based on a representative sample of these vessels. Financial data on vessel operations were obtained from the Financial Assistance Division, National Marine Fisheries Service (NMFS).

Vessel Characteristics

The sample consists of 28 side trawlers, 75% of these made of wood. Main characteristics:

	Average	Range
Registered length (ft.)	67 (62)	38-95
Gross tonnage (GRT)	72	17-178
Horsepower (hp)	293 (245)	110-675
Age (as of 1968)	20 (23)	1-54
Crew size	5.2	3-11

Figures in parentheses are averages for the entire New England groundfish trawler fleet (obtained from U.S. Coast Guard files). The average gross tonnage of a Massachusetts trawler in 1970 was 70 GRT. We believe the sample is fairly representative of the physical characteristics of the entire fleet. The analysis covers 36 vessel-years of operation--20 vessels in 1967, 16 in 1968. It is based on 2 years' data for 8 vessels and on 1 year's data (either 1967 or 1968) for the remaining 20 vessels.

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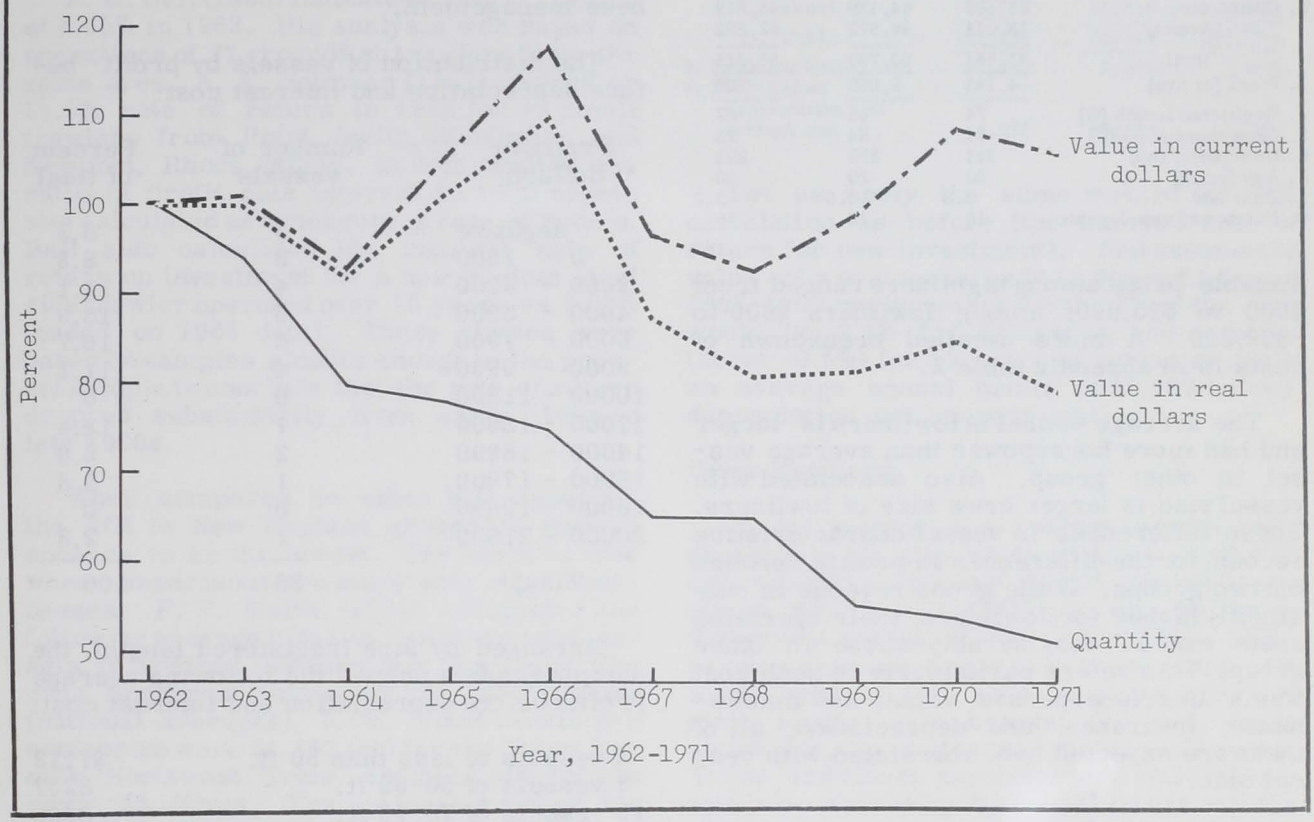
Figure 1. Changes in New England landings of food fish, 1962-1971.



Gross Receipts, Costs, and Profits

The sample vessels were operated from Massachusetts ports: New Bedford, Gloucester, Boston, and other small ports. They fished demersal species, mainly cod, haddock, pollock, cusk, hakes, and flounders. The average value of landings per vessel and year (annual gross receipts) was $86,819 ($88,610 in 1967, $84,581 in 1968). These gross receipt figures ranged widely from $23,200 to $193,800.

Gross receipts (gross revenue) depend on the quantities of fish landed and on the prices for species at auction or dock sales on the day landed. The quantities, in turn, depend on fishing time, size of vessel, horsepower of main engine, crew size, skill of the crew--to mention only the most important factors that may explain variation in gross receipts. Some of these factors have been analyzed intensively to determine the extent of the influence on gross revenue from vessel operations and on the level of interdependence among the factors. Of the main vessel characteristics, gross tonnage, horsepower, and crew size were the most important explanatory factors of gross revenues.

Of course, the vessel owner is more interested in profits for the success of his business. Therefore the vessels have been grouped by profits (net profits as defined for tax purposes). Vessels with lower profits (or losses) were placed in one group (lowliners); vessels with higher profits were placed in the other (highliners). The dividing point was the middle value--$750 for the entire sample.

For 1967-1968, the average per vessel and year gross receipts, costs of operation, and taxable profits for each group mentioned above and for entire sample, together with vessel characteristics for respective groups, follow:

	Lowliners	Highliners	All Vessels
		dollars	
1. Gross receipts	87,272	86,366	86,819
2. Costs: crew	43,450	44,189	43,819
vessel	48,011	36,572	42,292
total	91,461	80,761	86,111
3. Profit (or loss)	-4,188	5,605	708
4. Registered length (ft)	74	61	67
5. Gross tonnage (GRT)	91	54	72
6. Horsepower (hp)	311	275	293
7. Age (years)	20	20	20
8. Crew size	5.8	4.6	5.2
9. Number of vessel-years	18	18	36

Taxable profit among highliners ranged from $900 to $15,800; among lowliners $600 to -$20,300. A more detailed breakdown of costs is in appendix table 2.

The average vessel in lowliners is larger and has more horsepower than average vessel in other group. Also associated with vessel size is larger crew size of lowliners. These differences in vessel characteristics account for the differences in profits between the two groups. While gross revenue is only slightly higher for lowliners, their operating costs exceed considerably those in other group. This refers particularly to such cost items as trip expenses, repair and maintenance, insurance, and depreciation; all of these are expected to be correlated with vessel size.

Costs presented in table above include all expenditures, crew shares, and allowances for depreciation--as reported for income tax purposes. Allowances for depreciation range from 0 to $15,000. Because of this wide range, and because of various depreciation methods applied for tax purposes, it is more proper for an economic evaluation to consider income before depreciation. This procedure puts the vessels on a comparable basis. Also, the interest cost (ranging from 0 to $4,800) is a disturbing item. Some vessels were operated without any borrowed money, while other firms carried a heavy load of borrowed capital. Not accounting for the interest cost permits an evaluation of return to capital on the same basis (total capital).

The average profit before depreciation and interest cost (A. A. Holmsen labeled it the "amount available for interest and depreciation") for the entire sample was $7,389 per vessel and year. This profit on a highliner was 2.8 times that on a lowliner (see appendix table 2). On the average, it took $91.50 to produce $100 worth of fish dockside. This did not account for depreciation, return to capital, and reward for business management.

The distribution of vessels by profit before depreciation and interest cost:

Profit in dollars	Number of vessels	Percent of total
negative	3	8.3
0 - 1900	3	8.3
2000 - 3900	4	11.1
4000 - 5900	5	13.9
6000 - 7900	6	16.7
8000 - 9900	4	11.1
10000 - 11900	0	0
12000 - 13900	7	19.4
14000 - 15900	2	5.6
16000 - 17900	1	2.8
18000 - 19900	0	0
20000 - 21900	1	2.8
Total	36	100

Arranged by size (registered length), the sample vessels earned the following average profits before depreciation and interest cost:

8 vessels of less than 50 ft.	$7112
8 vessels of 50-69 ft.	8237
10 vessels of 70-79 ft.	8590
10 vessels of 80 ft. and over	5730

Return on Investment

Of course, the most important question remains: What is the rate of return on investment (ROI) in this fishery? This is difficult to answer because information is lacking on amount of capital invested and on market value of vessels. The most reasonable approach is to estimate rate of return from operations of a new vessel that would generate the income discussed before over an assumed period.

The replacement cost of an average trawler described in this analysis was around $125,000 in 1967. Let's assume that the resource and the price and cost structure will permit this new trawler to generate an average annual profit (before depreciation and interest cost) of $7,389--as did the sample fleet--over 20 years. Under these assumptions, the ROI is 1.67%. (This is measured by internal rate of return--the discount rate at which stream of

future profits is equal to investment.) Assuming a stream of the same annual profits over 15 years, the rate of return is negative.

F. W. Bell (1966) indicated a rate of return of 4.65% in 1963. His analysis was based on operations of 77 groundfish trawlers from the same area. A. A. Holmsen (1967) showed an 11.9% rate of return in 1964 for 46 small trawlers from Point Judith, Stonington, and Newport, Rhode Island. In both studies, the ratio of profit plus interest to total assets was calculated as a measure of rate of return. Bell also calculated the internal rate of return on investment for a new 80-foot steel side trawler operated over 15 years as 9.05% (based on 1963 data). These studies were based on samples similar enough to the present sample to conclude that the rate of return dropped substantially from early 1960s to late 1960s.

When compared to other U.S. fisheries, the ROI in New England groundfish fishery appears to be the lowest. The same is true when comparisons are made with other businesses. F. T. Smith (1971) calculated the following average rates of return to total assets of seafood distributors: for three Pacific Northwest firms, 18.3%; for 55 firms (national averages), 7.3%. Total assets per enterprise were $1,367,000 for the three Pacific Northwest firms, and $819,000 for the other 55 firms. The national average for manufacturing firms was 8.65%.

To earn a 10% rate of return (to account for higher risks in fishing), the annual profit of our new vessel would have to be $16,400 over 15 years, or $14,700 over 20 years. Only in 4 of 36 cases was profit before depreciation and interest that large.

Costs & Earnings Under 1970-1971 Catch & Price Conditions

The earnings of 1967-1968 can easily be translated into earnings of 1970-1971. Available data indicate that over the 3-year period the per-vessel quantity of fish landed of the Massachusetts otter trawlers fishing for groundfish decreased 15%; the average price dockside increased 41%. The combined effect of these changes was a 19.8% increase in gross revenues. During the same time span, costs for the entire economy increased 19.3%. Assuming the sample vessels experienced this same cost increase, earning under 1970-1971 catch and price conditions are:

	Lowliners	Highliners	All vessels
		dollars	
1. Gross receipts	104,552	103,466	104,009
2. Costs: crew	52,112	52,975	52,547
vessel	55,973	42,838	49,406
total	108,085	95,813	101,953
3. Profit (or loss)	-3,533	7,653	2,056
4. Profit before depreciation and interest cost	4,832	13,129	8,978

Let us apply the same method for ROI calculation as before (the internal rate of return for new investment). And assume the value of a new vessel as $141,000 (12.8% over 1967-1968 replacement cost). Then the rate would be 2.4% for 20 years, and negative (about -0.5%) for 15 years of operation (with an average annual profit of $8,987 before depreciation and interest cost).

Crew Earnings

In our sample, the average annual crew share per job site on trawlers was $7,836 (all vessels). It was $6,997 on lowliners (range $3,017 to $16,575); it was $8,893 on highliners (range $2,820 to $16,200). Equal regular shares are paid to each member. On some vessels that have larger crews and make longer trips, bonuses are paid, where applicable, to engineers, mates, and cooks. These additional payments are part of trip expenses shared by the vessel owner and the crew. They are not included in the crew earnings shown above.

In addition to his crew-member share, the trawler captain's commission was 10% of the boat share. The average captain's commission was $3,073 (average for all vessels), with $2,866 for lowliners and $3,280 for highliners.

How do these fishermen's earnings compare with earnings in other industries? The annual wages in some Massachusetts industries are:

	1967	1968
	dollars	
Mining	8,146	8,932
Contract construction	7,726	8,204
Manufacturing	6,514	6,944
Transportation and communication	6,928	7,469
Machinery (except electrical)	7,631	8,150
Electrical machinery	6,800	7,250
Motor freight and warehousing	7,003	7,481

Source: U.S. Department of Labor, Manpower Administration, Quarterly Reports.

The arithmetic mean (not weighted) of these other wages is $7,513 per year; in our sample, a deckhand on an average trawler earned $7,836.

Under catch and price conditions of 1970 and 1971, the crew's regular share per man and the captain's commission are:

	Lowliners	Highliners	All vessels
		dollars	
Regular crew share	8,392	10,661	9,396
Captain's commission	3,440	3,933	3,687

The regular crew share per man (average for all vessels) is at about the level of estimated wages in other industries listed before ($9,350 for 1970 and 1971).

It is estimated that the average vessel in our sample spent about 153 days at sea per year. These fishermen work about 12 hours a day. So a fisherman earned $5.12 per hour, about 13% above earnings in other industries. One can expect the fishermen's earnings to be higher because of longer working time per day and other hardships.

Main Problems of New England Groundfish Fishery

Operators of New England otter trawlers fishing for groundfish species face difficult circumstances. Fishing costs are so extremely high in relation to revenues that 44% of these operations lose. More than half the gross receipts are paid to labor in the form of net crew shares and bonuses. Another 37% is spent on trip expenses (fuel, ice, food), repairs, insurance, and fishing gear. After depreciation is accounted for, less than 1% of gross receipts is left to the average vessel operator. The rate of return on invested capital is very low compared to opportunities in other industries.

On the cost side, two items are of special concern to vessel operators. One is high insurance premiums. In a survey of current insurance costs (Miller and Nash, 1971), it was found that the average cost per vessel in 1968-1969 was:

	Hull	Protection & Indemnity (P&I)
Massachusetts vessels	$4,400	$3,843
Other New England vessels	2,000	1,097
Total New England	3,700	2,855

The age of a vessel and the construction material used are the two strongest determinants of hull insurance rates. Wood vessels are considered poorer risks than steel vessels. Their insurance rates are about 1.3 percentage points higher. Also, rates on old vessels are considerably higher than on new ones. On the average, each year added to vessel age would tend to increase the rate by 7/100ths of a percentage point. Insurance costs are increasing because of increasing individual claims. Damages sustained in accidents are becoming more costly to repair. There is no actuarial basis for establishing insurance rates. Neither the insurance nor the fishing industry has sufficient knowledge of the characteristics of a vessel that affect the risk of loss. Thus premiums and risks are not likely to be closely related. Furthermore, much fishing-vessel insurance now is carried by overseas companies. These companies have little interest in programs which might lead to reduced losses and reduced premium costs.

A recent U.S. Coast Guard study indicated that U.S. commercial fishing vessels have the worst safety record. Part of the reason, with only minor exceptions, is that fishing vessels traditionally have been exempt from safety regulations. The study suggested alternative safety programs to reduce accidents and to justify substantial cuts in insurance premiums. Savings in hull insurance premiums were estimated to range from 28% to 56% in the North Atlantic area.

Protection and Indemnity (P&I) insurance costs increase with crew size. In 1968-1969, they were $668 per crewman (includes New England and Middle Atlantic). These costs increased 36% in 4 years.

The other item is the cost of fishing gear. Fishermen complain that the domestic net-producing industry is protected by a high duty on imports (Vondruska, 1971 MS). For example, the duty on synthetic fiber nets and netting is equal to about a 50% ad valorem duty (25 cents per pound plus 32.5% ad valorem). It is estimated that the removal of this duty would make possible a maximum price reduction of 33%. It can be assumed that without these high import charges the foreign competition would cause domestic prices to fall, thus cutting costs of vessel operations. The maximum estimated impact of removing U.S. import duties on fishing gear, nets, and electronic equipment would

be a reduction in costs of 2 to 3% of gross receipts.

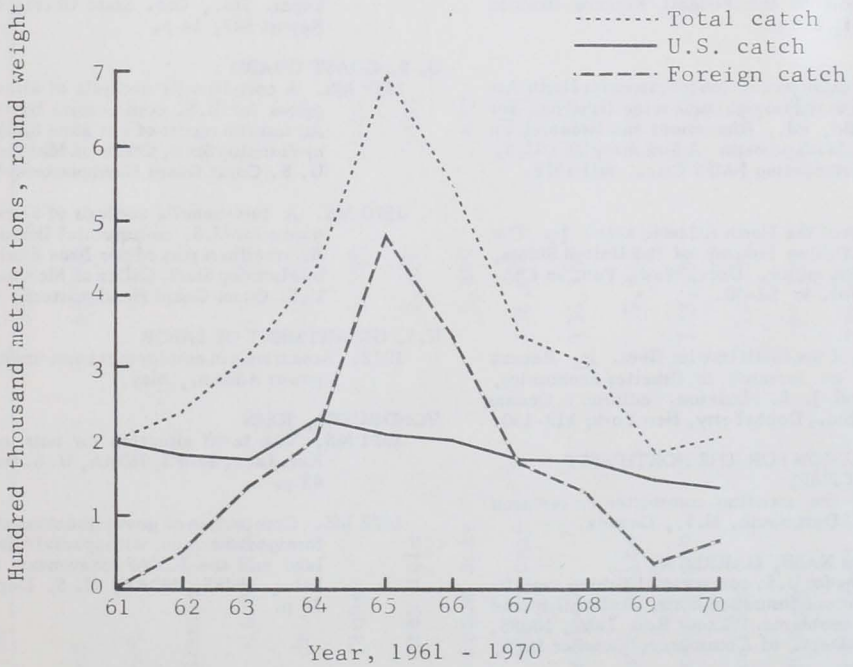
On the supply side, the New England trawlermen have to compete with huge fleets of modern European trawlers. These trawlers are equipped with processing and freezing plants and are supported by factory and supply ships on the fishing grounds. The tremendous increase of fishing effort during the last decade in areas traditionally fished by U.S. fishermen brought about the present situation. Several valuable fish stocks have been depleted. Drastic conservation measures had to be imposed by the International Commission for the Northwest Atlantic Fisheries (ICNAF) to protect these stocks from extinction. The changes in catch of groundfish and flounders in ICNAF statistical subarea 5 are illustrated in figure 2. ICNAF statistical subarea 5 includes Georges Bank and fishing grounds in Gulf of Maine and off Southern New England. In 1970, about 91% of U.S. catch of groundfish and flounders in ICNAF convention area was in subarea 5.

Only 10 years ago, almost the entire catch in this area was by U.S. fishermen. While the annual U.S. catch during 1961 through 1966 remained near 200,000 metric tons, the catch by other countries skyrocketed from about 108,000 metric tons in 1961 to 580,000 tons in 1965. (Area covered from Maine to Cape Hatteras, N.C., including Canadian catches.) The effects of this gigantic pressure on the resource became evident in recent years. The catch by all countries (including U.S.) came down to level of U.S. catch alone of the early 1960's; the U.S. catch dropped to two-thirds of its 1961 level.

The conservation problem in the Northwest Atlantic led to the implementation through ICNAF of international catch quotas for haddock in 1969 and yellowtail flounder in 1970. ICNAF quotas with national allocations for herring stocks become effective in 1972. Similar ICNAF national quotas agreed to in June 1972 are expected to become effective for stocks of cod, yellowtail flounder, silver hake, and red hake in January 1973.

Besides dwindling resources, these trawler operators have to compete in the market with imports of groundfish. In 1968 these exceeded

Figure 2.--Catch of Groundfish in ICNAF Subarea 5.



Source: ICNAF Statistical Bulletin, annual editions, Dartmouth, N. S., Canada.

U.S. landings by 182% in quantity (converted to round fish), and by 185% in value. These percentage figures are based on total U.S. landings and total U.S. imports of groundfish. New England landings of groundfish are 78% of total U.S. groundfish landings.

These imports originated where fishing fleets are State owned, or where fisheries are subsidized to a much greater extent than the U.S. did in the past (e.g., Poland). A recent report on Government assistance to fisheries (Vondruska, 1972 MS.) stated that subsidization in one country was 30 times as high, and in several others 7 to 9 times as high as in the U.S. Among countries with high subsidy ratios are Norway and Canada. These are also the main suppliers of U.S.-imported groundfish.

With falling catch rates, the probability of improvement in profitability of trawler operations is almost nil. Increasingly, one can expect more marginal vessels to leave this fishery. Either these will be scrapped (old vessels) or will switch to other fisheries if conversion to other gear is justified. The result will be fewer jobs for fishermen.

Would it be easy for them to find other jobs? The answer is probably no. As of March 1972, the unemployment rate in Boston was 6.4%; in New Bedford, 10.3%; in Fall River, 10%. In 5 other major labor areas in Massachusetts, this rate ranged from 8.2 to 12.5% (U.S. Department of Labor, 1972).

The crews on these trawlers seem to be in much better economic situation. Earnings per job site compare favorably with earnings in other industries in the same region. This fact, combined with the labor-market situation, may explain why so many old vessels, despite low rates of return to capital, are still operated by the owner-captain.

Acknowledgment

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LITERATURE CITED

BELL, FREDERICK W.
1966. The economics of the New England fishing industry: the role of technology change and government aid. Research Report to the Federal Reserve Bank of Boston, No. 31, 216 p.

CARLSON, ERNEST W.
Forthcoming. Cross-section production functions for North Atlantic groundfish and tropical tuna seine fisheries. In: A. A. Sokoloski, ed., Discussions and Research on Ocean Fishery Management: A Summary of a U.S. Workshop. Forthcoming NMFS Circ., fall 1972.

EDWARDS, ROBERT L.
1968. Fishery resources of the North Atlantic area. In: The future of the fishing industry of the United States, De Witt Gilbert, editor. Univ. Wash. Pub. in Fisheries, n.s., Vol. 4: 52-60.

HOLMSEN, ANDREAS A.
1967. The economics of the small trawler fleet. In: Recent developments on research in fisheries economics, F. W. Bell and J. E. Hazleton, editors. Oceana Publications, Inc., Dobbs Ferry, New York; 119-130.

INTERNATIONAL COMMISSION FOR THE NORTHWEST ATLANTIC FISHERIES (ICNAF)
1970. Proceedings of the standing committee on research and statistics. Dartmouth, N.S., Canada.

MILLER, MORTON M. and NASH, DARREL A.
MS. Insurance coverage for U.S. commercial fishing vessels: a survey of current insurance costs, availability and other special problems. Econ. Res. Lab., NMFS, NOAA, U.S. Dept. of Commerce, October 1971, 135 p.

SMITH, FREDERICK J.
1971. Economic condition of selected Pacific Northwest seafoods firms. Studies in Marine Economics, Ag. Exper. Sta., Ore. State Univ., Corvallis, Special Report 327, 14 p.

U. S. COAST GUARD
1969 MS. A cost-benefit analysis of alternative safety programs for U.S. commercial fishing vessels (part I). An interim report of our Issue Study being conducted by Planning Staff, Office of Merchant Marine Safety, U. S. Coast Guard Headquarters, Wash., D.C.

1970 MS. A cost-benefit analysis of alternative safety programs for U.S. commercial fishing vessels (part II). An interim report of our Issue Study being conducted by Planning Staff, Office of Merchant Marine Safety, U.S. Coast Guard Headquarters, Wash., D.C.

U.S. DEPARTMENT OF LABOR
1972. Area trends in employment and unemployment. Manpower Admin., May.

VONDRUSKA, JOHN
1971 MS. The tariff situation for nets and netting. Econ. Res. Lab., NMFS, NOAA, U. S. Dept. of Commerce, 43 p.

1972 MS. Comparison of government assistance for U. S. and foreign fishermen, with special reference to New England and the ICNAF convention area. Econ. Res. Lab., NMFS, NOAA, U. S. Dept. of Commerce, 36 p.

Appendix Table 1.--New England landings of food fish, 1962-1963, 1970-1971.

Fish	1962		1963		1970		1971	
	Q	V	Q	V	Q	V	Q	V
	1000 lbs.	$1000	1000 lbs.	$1000	1000 lbs.	$1000	1000 lbs.	$1000
cod	43,946	2,956	39,901	2,794	52,651	5,648	52,246	6,242
cusk	1,858	101	1,909	110	1,351	101	1,776	157
flounders:								
blackback	15,713	1,653	16,142	1,590	22,294	3,102	20,283	3,014
dab	4,449	324	4,652	356	5,692	774	4,947	712
fluke	4,595	1,080	2,906	899	323	156	355	179
grey sole	2,600	301	3,091	355	5,976	925	7,087	1,153
lemon sole	2,692	633	1,967	489	2,284	585	2,947	783
yellowtail	56,662	4,184	78,009	5,055	67,337	9,885	54,748	8,462
haddock	134,169	10,903	123,881	11,695	26,880	6,043	21,583	5,648
hake, white	5,611	219	6,126	253	4,061	250	5,682	343
ocean perch	123,983	5,223	108,292	5,147	55,290	2,725	59,852	3,047
pollock	16,331	685	14,601	670	8,788	692	10,842	828
whiting	97,737	2,039	86,558	1,914	40,131	3,386	27,819	1,596
other food fish	231,910	5,849	212,735	5,226	106,394	5,110	110,054[1/]	6,139[1/]
Total food fish	742,256	36,150	700,770	36,553	399,452	39,382	380,221	38,303

1/ Quantity and value of fish used for bait, reduction and animal food are estimated. Exact figures are not yet available.

Source: NMFS, Fishery Statistics of the United States, (annual editions, 1962-1968). 1969-71 data from NMFS, Statistics and Market News Division.

Appendix Table 2.--New England groundfish trawlers: costs and earnings per vessel and year.

Item	Low-liners		High-liners		All vessels	
	$	%	$	%	$	%
1. Gross receipts	87,272	100.0	86,366	100.0	86,819	100.0
2. Cost of operation:						
(a) trip expenses	18,489	21.2	12,472	14.5	15,481	17.9
(b) net crew share	40,584	46.5	40,909	47.4	40,746	46.9
(c) captain's commission	2,866	3.3	3,280	3.8	3,073	3.6
(d) repairs and maintenance	7,022	8.0	6,050	7.0	6,536	7.5
(e) gear and supplies	4,428	5.1	4,456	5.2	4,442	5.1
(f) insurance	5,844	6.7	4,572	5.3	5,208	6.0
(g) payroll taxes	1,511	1.7	1,956	2.3	1,733	2.0
(h) miscellaneous	2,611	3.0	1,811	2.1	2,211	2.5
Subtotal (a)-(h)	83,356	95.5	75,506	87.4	79,431	91.5
(i) interest	1,350	1.5	1,144	1.3	1,247	1.4
(j) depreciation	6,755	7.8	4,111	4.8	5,434	6.3
Total (a)-(j)	91,461	104.8	80,761	93.5	86,111	99.2
3. Profit before taxes	(-4,188)	(-4.8)	5,605	6.5	708	.8