Studies in MARINE ECONOMICS

Economic Condition of Selected Pacific Northwest Seafoods Firms

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According to an increasing number of industry spokesmen, the U.S. seafood industry is "going broke." Recent heavy doses of government subsidization (loan, construction subsidies, import restrictions, etc.) are certainly not indicative of a prosperous industry.

While concern over the seafood industry's economic condition is being expressed by more and more influential bodies (most recently the U.S. Congress through new legislation and the President's Commission on Marine Science, Engineering, and Resources) there continue to be reports of at least moderate prosperity in some segments of the industry. The Bureau of Commercial Fisheries' annual report for 1967 referred to several such apparently prosperous segments, including the tropical tuna fleet conversion from bait fishing to purse seining and the exploitation of King Crab in Alaskan waters.

While concern for the industry increases, knowledge of its economic condition continues to be based upon such surface evidence as landings, prices, imports, number of vessels, and the expressions of industry spokesmen. Decisions regarding fisheries management, allocation of public funds for seafood industry research and training, and the enactment of new legislation are too important to be based upon such surface evidence. Analysis of economic condition based upon profits or losses of firms within the industry provides a more accurate basis for decision-making within the industry, as well as a basis for enlightened research and educational efforts and public policy and political action.

The Pacific Northwest seafood industry is a homogeneous and important segment of the U.S. seafood industry. This report describes the economic condition of the Pacific Northwest seafood industry by analyzing individual firm profits and losses. Included are data from fishing firms, seafood processors, and seafood distributors. The environment within which these firms operate is described and comparisons are made among firms within this region and with similar firms in other fishing regions.

DEFINITIONS

There are numerous measures of economic condition. These include employment, number of firms, size of firms, and gross receipts. Since the primary emphasis is on the economic condition of firms within the industry, economists' and accountants' measures of financial success, *i.e.*, "profit," returns to investment, returns to operator, etc., are more relevant than gross measures. Therefore, "profit" and returns to various factors will be used almost exclusively in this report. Since these measures are often confused and misunderstood, they deserve some explanation.

Returns to a factor (management, for example) are found by subtracting all costs except the cost of management from all receipts. Although this appears uncomplicated, the cost of such factors as capital or unpaid labor is not always treated in the same manner. Standard accounting procedure provides for those costs actually incurred, *i.e.*, actual interest paid on borrowed funds and actual wages paid. This is how they usually appear in the financial statements of business firms. The economist, on the other hand, prefers to neutralize the effect of different equity positions and peculiar labor-management situations among firms by incorporating an equal (per unit) capital, labor, and/or management cost for otherwise unpaid factors. This allows for more accurate comparisons of economic condition. Both procedures are used in this report for reasons which are explained.

PREVIOUS WORK

Although a number of studies are referenced throughout this report, there are several that deserve separate treatment. Three fairly recent studies have been published by the Canadian Economics Branch of the Department of Fisheries and Forestry, one each in cooperation with British Columbia, Nova Scotia, and a group of Atlantic prov-

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SPECIAL REPORT 327, SEPTEMBER 1971
AGRICULTURAL EXPERIMENT STATION
OREGON STATE UNIVERSITY, CORVALLIS

inces (15).** These studies are unusually complete with respect to fish harvesting enterprises. They provide detailed financial data and catch data for samples of a variety of vessels. Prices, total fishing effort, and crew earnings are also analyzed. The East Coast studies are based on data taken from actual vessels; the British study is based on hypothetical returns to average-type vessels.

Although now over 12 years old, the Green and Broadhead (24) study of tropical tuna vessels in California demonstrated the adaptability of standard accounting data to a study of this type. Green and Broadhead were also able to identify vessel capacity as an important factor in operating cost and total catch of purse seiners, a finding which has been reflected by dramatic changes in vessel capacity of the industry over the past 10 years.

Andreas Holmsen reported on the economics of Rhode Island's small trawler fleet in a 1967 book edited by Bell and Hazelton (4). Holmsen'es data, obtained through personal interviews with skippers, were used to derive such measures of economic condition as return to capital, captain's share, and crew share.

Crutchfield's (32) study of the Pacific Northwest fisheries conducted under Bonneville Power Administration and U.S. Army Corps of Engineers auspices in 1967 does not consider the economic condition of firms *per se,* but it does provide an indication of trends in employment, number of firms, and value of landings. It is the only study of this type for the Pacific Northwest conducted in recent years. It therefore provides a valuable base for new research. Two other studies that reflect the Crutchfield expertise include a 1962 study of the Pacific Halibut Fishery (19) and a 1968 study of the Pacific Salmon Fishery (20). Although both of these studies deal with the common property resource management problem, they also present valuable information regarding the economic condition of the halibut and salmon fleet.

A 1964 study by Norton and Miller (27) analyzed employment and earnings of the Boston large-trawler labor force. In addition to measuring fishing income, Norton and Miller measured labor mobility, earnings stability, and labor turnover, all reflecting the economic condition of an industry.

A 1966 study by Carley (16) at Experiment, Georgia, described costs and earnings by type and size of vessel for Georgia's major fisheries. This study also measured the economic impact of the total fishery and discussed such common industry problems as regulation and pollution.

The Bureau of Commercial Fisheries Division of Economic Research has an ongoing project to study the economic condition of U.S. fisheries. The latest and most closely related segment of this project is reported in *Working Paper #32* by Perrin and Noetzel (28). The authors investigated the feasibility of newly constructed San Pedro wetfish boats harvesting jack mackerel and anchovies at a profit, and in the process the authors described the economic condition of the present wetfish fleet.

Several additional studies were received too late to be incorporated into this study but deserve special mention. Frederick W. Bell (15) under the sponsorship of the Federal Reserve Bank of Boston, describes the New England fishing industry with special emphasis on groundfishing. Although based on pre-1966 data, the analysis is particularly valuable. The reader who is especially interested in the economics of the New England fishery will find Bell's study quite valuable.

In 1970, the Division of Economic Research, Bureau of Commercial Fisheries, released seven working papers dealing with the economic condition of seven specific fisheries, halibut, clams, oysters, shrimp, king and Dungeness crab, tuna, and salmon (7, 8, 9, 10, 11, 12, 13). These working papers all include data regarding costs and earnings of vessels, earnings to fishermen, productivity, costs per pound landed, and historical growth rates. They also include some data on demand, domestic production, employment, vessels, effort, biological stock assessment, international trade, foreign production and consumption, and government programs. As indicated in the preface:

> "The purpose of *Basic Economic Indicators* is to bring together pertinent economic, technological, and biological data . . . which will materially aid research and development currently being conducted on each fishery and will help guide policy decisions."

The industry

For purposes of this study the Pacific Northwest includes the coastal areas of Washington, Oregon, and Northern California. This region is characterized by numerous smaller ports and accompanying communities with the exception of Seattle and Puget Sound and Portland and the Columbia River. Seattle (and Puget Sound) is a major fishing and seafood processing area but, although Portland (and the Columbia River) is a major shipping area, most of this region's fishing activity is in the lower Columbia, centering around Astoria and in the ocean off the mouth of the Columbia. Table 1 lists the number and location of fishing ports and population centers in the Pacific Northwest.

During 1969 more than 11,000 vessels fished on a regular basis from the ports listed in Table 1 (21). The majority of these vessels are small (5 tons, 18 to 30 feet) and generally net fish in more protected waters, except for dories which troll for salmon in the open ocean. The larger vessels are multipurpose, between 40 and 80 feet in length, although sizes may range from 30-foot trollers to 296-foot steel trawlers. The majority of Pacific Northwest commercial fishermen are owner-operators. Larger vessels hire one or more crewmen on a share basis. They may troll for salmon, and for tuna if their vessel is large enough, and frequently fish crab during the winter and spring months. A large number of salmon purse seine vessels operate out of Washington ports and salmon gillnet vessels fish Columbia

** See Bibliography.

Supported in part by the National Oceanic and Atmospheric Administration (administered by the U.S. Department of Commerce) Institutional Sea Grant GH 97.

Table 1. Fishing Ports, Seafood Landings, and Processing Centers of the Pacific Northwest

Fishing ports	Pounds[1] seafood landed	Number[2] processing plants
Blaine		4
Bellingham		7
Neah Bay		3
Anacortes		7
La Push		2
Port Townsend	81,263,088	1
Everett		3
Seattle		40
Lilliwaup		3
Tacoma		11
Olympia		16
Shelton		14
Aberdeen		7
Westport	13,168,403	7
Raymond		5
Ilwaco (river)	4,323,995	4
Astoria (ocean)	58,263,521	10
Seaside		3
Kelso[3]		2
Garibaldi	1,336,055	3
Pacific City	467,411	1
Portland[3]		4
Depoe Bay	541,265	1
Newport	10,565,925	7
Albany		1
Winchester Bay	5,202,647	2
Coos Bay	13,799,710	5
Bandon	203,351	..
Port Orford	2,649,314	1
Gold Beach	41,139	1
Brookings	3,173,980	3
Crescent City	9,266,453	3
Klamath		4
Trinidad	633,757	1
Eureka	12,404,095	3
Fields Landing	9,557,381	..
Fort Bragg	10,293,227	5
Albion	165,753	..
Point Arena	106,140	..
Sacramento		1
Santa Rosa		1
Bodega Bay	2,784,556	1

[1] 1968 (1967 for California).
[2] 1968.
[3] Included in Astoria-Ilwaco landings.

River and Puget Sound waters. Drag vessels generally harvest groundfish (sole, flounder, perch, etc.) year-round, although some may troll for salmon and tuna during the peak of the season. Shrimp vessels also frequently convert to other fisheries. Halibut fishing is generally quite specialized. Typical commercial fishing vessels of the Pacific Northwest are described in more detail in the following sections.

Seafood processing and marketing is characterized by several relatively large firms handling multiple products and numerous smaller firms that frequently specialize in such seafood as salmon and crab. Most larger firms find it necessary to maintain branch or subsidiary processing plants or buying stations in the smaller ports while the main plant and/or office may be in Sacramento or Seattle. Seafood landed and processed in the Pacific Northwest is marketed throughout the United States and in a number of other countries. The population centers of California and Washington continue to be prime market areas for crab and shrimp, but salmon and groundfish now are marketed extensively on the East Coast and in Europe. Pacific Northwest albacore tuna is nearly all canned and is marketed throughout the United States.

The Resource

Table 2 provides data on the quantity and value of seafood landings in the Pacific Northwest. The industry is characterized by several high-valued specialized seafoods which consistently comprise the largest percentage of total landed values for the region.

The existing stocks of presently exploited species seem to be adequate in most cases to support moderate increases in harvests. Salmon populations should benefit from recent improvements in hatchery programs and a greater regional commitment to improving habitat. Also, values of the landings of salmon are expected to be higher as the relative price of salmon rises (18).

Tuna landings should increase in the future as more biological information becomes available and is utilized by fishermen. Certain environmental conditions off the coast, such as water temperature, depth of the thermocline[1], upwelling of nutrient-rich water, and wind direction, seem to be related to the albacore's arrival. The potential for in-

[1] The sharp delineation in the ocean between cold water masses from below and warm water masses from above.

Table 2. Pounds and Value of Seafood Landings in British Columbia, Washington, and Oregon for 1969, and Northern California for 1967

Species	British Columbia[1]		Washington[2]		Oregon[2]		Northern California[2]	
	Million pounds	Million dollars	Million pounds	Million dollars	Million pounds	Million dollars	Million pounds	Million dollars
Salmon	78.9	27.6	31.9	12.4	10.9	4.4	5.3	2.8
Tuna	....	....	3.6	0.8	29.8	6.7	4.9	.9
Groundfish	35.0	12.3	47.4	3.0	23.2	1.9	19.6	1.5
Shellfish	[3]	[3]	28.4	7.3	20.6	4.5	12.6	2.0
All Other	50.5	4.2	33.4	4.6	1.0	.1	....	....
TOTAL	164.4	44.1	144.7	28.1	85.5	17.6	42.4	7.2

[1] Source: "Fisheries of Canada," Volume 22, No. 8.
[2] Source: Respective fish commissions and departments.
[3] Combined with all other.

creased landings lies in the ability to predict where and when the water will be suitable for tuna. Though total increases of all North Pacific catches of albacore is doubtful, the U.S. fishermen's share can be increased by more precise information systems (29).

Halibut, in contrast, appear to be harvested near or above their maximum sustainable yield, approximately 55 million pounds, and no substantial increase in landings can be expected (29).

Recent landings of shrimp have been high in relation to past landings (Oregon's 1969 landings were 10.3 million pounds compared to an eleven-year average of 3.3 million pounds). Shrimp fishermen in Northern California, Oregon, and Washington feel that most area shrimp beds are known and that increases in production will come from the discovery of new beds in other areas such as Alaska. The oyster farming industry is presently the subject of much interest and study. Future harvests will probably not increase substantially until a reliable and economic source of seed is developed. Oyster production must also compete with industry and recreation for suitable waterfront land. Dungeness crab populations fluctuate erratically from year to year due to natural conditions, and as yet there is not much hope for "crab farming." Present research by the Fish Commission of Oregon is aimed at rearing crabs to a certain stage of development to be released into the ocean, much as a fish hatchery operates. The project remains experimental at present, and until more is known about the biology of the crab, there seems little reason to expect sustained production increases in the future (18).

A more immediate potential for increased landings seems to be in the harvest of presently underutilized species of groundfish, as well as species such as the anchovy and squid. Ahlstrom (1) believes that catches of flatfishes could be increased perhaps twofold in the future.

In conclusion, the stocks of presently exploited species appear to be adequate to sustain or slightly increase the size of present landings. The greatest potential for increased landings is in the harvest of certain species of bottomfish, anchovy, and squid not presently utilized. This, of course, is contingent on a market demand for these species much higher than exists at present and the resolution of problems of foreign exploitation of the fish stocks.

The economic environment[2]

Fishermen, processors, and marketing firms are subject to federal, state, and local regulations, pricing mechanisms in the labor and capital markets, pricing mechanisms in the seafood markets, and the relative competitive position of firms and agencies with which they do business. Commercial fishermen seeking to fish in Northeastern Pacific waters operate under unique institutional arrangements, and fishermen decisions are influenced by these arrangements.

Regulations. A commercial fisherman is faced with many regulations; *viz.*, closure of fishing by season, by fish, by area, by quota, by gear; minimum fish sizes, minimum mesh sizes; limitations of the utilization of catch; and payment for a variety of licenses and poundage fees. He is subject to the laws of the state in whose waters he is fishing, and the laws of the state in which he lands the catch. These laws are not always in agreement.

An example of conflicting regulations is the fact that Washington allows use of purse seines in specified waters, while Oregon does not.

In contrast to the commercial fishermen, the processor has fewer regulations to contend with. Indeed, if the processor is not engaged in interstate commerce or shellfish packing, the regulations he must comply with are quite general and not conflicting.

If the processor is involved in interstate commerce, or processes oysters and clams, the plant is subject to unscheduled periodic inspection. Seafood processors can make use of the Bureau of Commercial Fisheries' inspection and product-grading service, but this program is voluntary. The fish processor operating in the Pacific Northwest, therefore, must comply with basic sanitation and labeling regulations, but the laws do not conflict, and seem to be realistic.

Services. The economic condition of fishing firms is directly affected by credit availability and cost of equipment, gear, supplies, capital, and labor, as well as fish supply and price. Equipment and gear needed by fishermen can be purchased in numerous outlets in coastal communities and larger cities such as Portland, Seattle, and Tacoma. Most outlets offer a wide variety of items ranging from galley equipment and fuel to marine engines; however, some outlets specialize in one type of item such as hydraulic and mechanical fishing gear or nets and netting.

Financing offered by the gear and equipment suppliers varies considerably, but in a recent survey of 34 outlets[3], only 7 stated they gave no credit at all and 18 stated they gave more than 50 percent credit. The most frequent terms of credit mentioned were 30 to 90 days, with no interest charges. There are alternate means of financing available to fishermen; some of the larger purchases can be financed through the National Marine Fisheries Loan Fund, commercial banks, and occasionally credit is obtained through seafood buyers.

Wholesale gear and equipment prices over the last five years have gradually increased (not adjusting for increases in the general price level) and suppliers generally agree that most wholesale price increases result in corresponding equal retail gear and equipment price changes. Prices on nets and netting appear to have increased approximately 5 percent over the last five years (as estimated by two companies who deal exclusively in nets), whereas boat hardware has experienced larger increases, probably between 10 to 20 percent. Increases in electronic gear appear to be less than that on boat hardware, as estimated by retail store managers.

There are no central hiring halls for fishing vessel crewmen as there in many industries. Boat owners usually find crews and captains through personal contact and informal arrangements. Crewmen are paid on a share basis known as the lay system (a percentage of receipts). Their incomes depend on the success of the trip and the price received

[2] This section is based on research conducted during 1969 by Sandra Batie, a research assistant in Marine Economics.

[3] Conducted by the author during July and August, 1969.

for the product, as well as the number of crewmen aboard. Seattle and Astoria are the only ports of consequence where crewmen have been unionized.

Labor for processing firms is nearly all unionized and wages are therefore relatively uniform and consistent from plant to plant. The majority of workers in processing plants are women who are usually providing a secondary or supplementary source of family income.

In addition to the traditional sources of capital, such as banks and mortgage and loan companies, there are several governmental finance programs available to fishermen through the National Marine Fisheries Service and through the Small Business Administration. The Fisheries Loan Fund Program of the National Marine Fisheries Service (NMFS) provides loans to eligible applicants for building, equipping, maintaining, or operating new or used fishing vessels. To be eligible, an applicant must have been refused credit at reasonable terms from other financial lending institutions and must show the ability to operate the vessel successfully. Reasonable terms refer to repayment rather than interest. Also, the Fisheries Loan Fund Act provides that the contemplated vessel, if it is not a replacement vessel, must not cause economic hardship to other fishermen.

There is also a Fishing Vessel Mortgage and Loan Insurance Program which provides insurance for loans supplied by financial institutions other than the government.

A fisherman may also obtain protection against losses from vessel seizure by subscribing to the NMFS fund at a fee of $60 plus $1.80 per gross ton. This fund protects against loss or damage of the vessel, gear, or catch due to confiscation of the vessel by another country.

Any fisherman or cooperative who is not eligible for assistance from the NMFS, and cannot obtain financial assistance elsewhere, can apply to the Small Business Administration for development or disaster loans. A maximum of 5½ percent per annum is charged on direct loans by the Small Business Administration, and if commercial banks partially contribute to the loan they are forbidden to charge more than 8 percent per annum. The loans mature in 6 to 15 years depending on the type, and collateral is required. Disaster loans have an interest rate of 3 percent per annum and a maturity date of up to 30 years, with no specific requirements for collateral.

Pricing. The pricing mechanism in the Pacific Northwest seafood industry is extremely complex. Retail, wholesale, and exvessel prices are subject to varied and countervailing influences such as availability of stocks in the ocean, domestic landings, foreign landings, imports, bargaining power and expertise of fishermen's associations relative to processors, carry-over stocks (real or ficticious), and occasionally the independent actions of a well-established broker. According to traditional economic theory, accurate estimation of market demand and supply at each of the marketing levels will permit reliable prediction of seafood prices. Such estimation is simplified if we assume a profit motive for firms, rational decision-making on the part of consumers, a maximum of resource mobility, a free exchange of information, and no undue market power for the firms involved. Unfortunately, these conditions are satisfied only to a very limited degree in the seafood industry; therefore, not only are prices difficult to predict, but the pricing mechanism is difficult to describe accurately.

Fishermen are organized into such associations as the Columbia River Gillnetters Association, Fishermen's Marketing Association of Oregon, Salmon Trollers Marketing Association, Chignik Boat Owners Association, and Fishermen's Marketing Association of Washington whose primary purpose is to bargain with processors for price. Each represents one or some combination of species such as salmon or groundfish and attempts to negotiate a price for that species prior to the season. Some are successful by obtaining written agreements to publish prices (ground fishermen), while others are able to obtain verbal agreement on a beginning season price. Some prices will vary during the season and from port to port depending upon the strength of the agreement and the pressures placed upon price by market demand and volume of landings.

Processor-distributor pricing arrangements are generally less formally determined, a short telephone call or visit usually being sufficient. Distributor-retailer pricing is heavily influenced by the market situation outside the region. Key brokers in such prime market areas as Los Angeles, Chicago, and New York are frequently contacted by distributors and their knowledge and evaluation of the overall market has a significant influence on distributor-retailer pricing.

Sources of data

Data are taken from Marine Economics Data Sheets developed by the author in 1969, from the British Columbia and Nova Scotia returns from fishing vessels studies (15), the Crutchfield-Zellner halibut study (19), the Crutchfield-Pontecorvo salmon study (20), all referenced earlier, and the Robert Morris Annual Statement Studies (3). Financial information on various processors and distributors were obtained directly from representatives of the firms and from miscellaneous published sources.

The Marine Economics Data Sheets are developed through an interview process with five to eight of the above-average fishermen in each port represented and for each type of vessel. The data are intended to be a composite of from 10 to 100 vessels of that type and size with an *above-average* production and *above-average* gear and equipment. Although it may be misleading to make comparisons among vessels of different sizes and types, this difficulty is partly overcome by applying a uniform method of analysis to each. For example, an opportunity cost of the owner-operator at least equal to the percentage crewshare is included in variable costs. Also a uniform opportunity cost (interest) is charged against average investment and operating capital whether or not interest is actually paid.

The British Columbia data are not comparable to the Marine Economics Data Sheets since they represent arbitrarily classified vessel sizes and types, and costs and returns were developed by the Department of Fisheries and Forestry from sales slips and vessel registration applications only. Nevertheless, these data provide some indication of the economic condition of the significant salmon gillnet and purse seine fishery in British Columbia waters.

The 1962 Crutchfield-Zellner halibut study was based on a survey of 50 of the then existing 165 Seattle halibut vessels. This information has been updated to a limited extent with data provided by the International Pacific Halibut Commission. Crutchfield and Pontecorvo in their more recent salmon study base their analysis on a 1963 study of salmon gear limitation by the University of Washington Department of Fisheries (30) in which Crutchfield was also involved. In this study Crutchfield obtained income tax information from 21 purse seiners and financial information from gillnetters via mail questionnaires and interviews.

Economic condition of fishing firms

Fishing success requires a high degree of skill and is subject to wide and incompletely predictable variations in weather, fish availability, and markets. Therefore, fishing firms in any fishery experience a wide range in earnings from season to season and from one firm to another. It is misleading to discuss the average when the extremes are more common. Nevertheless, in spite of variability and limitations of data, some averages will be used when comparisons are made.

Nine Composite Above Average Vessels. Table 3 provides a summary of costs and returns from Marine Economics Data Sheets for nine composite fishing vessels. These are *above-average* draggers, trollers, crabbers, shrimpers, and gillnetters for the size and area shown. Investment ranges from $87,000 for an 80-foot Washington dragger to $9,755 for a 28-foot Oregon gillnetter. Costs are divided into variable and fixed including opportunity costs as explained previously.[4] Gross receipts less total costs is the return to operator management and ranges from $3,021 for the 50-foot Oregon shrimp and crab vessel to $–15,842 for the northern California troll and crab vessel. Return to investment ranges from 27 percent for the 32-foot Oregon troll and crab vessel to –10.9 percent for the same California troll and crab vessel mentioned above.

Another measure of economic condition, return to labor and management, is illustrated in Table 4 for the same nine composite vessels. Return to labor and management is the opportunity cost of operator's labor previously included as a variable cost plus the return to management illustrated in Table 3. Assuming the operator is paying interest on average investment as illustrated in Table 3, the return to labor and management is his "take-home" pay. The predominantly negative return to management appearing in Table 4 (seven of nine vessels) appears to imply poverty or impending bankruptcy. But the fisherman is a laborer and investor as well as a manager in his own business and therefore earns something for this. Returns to labor and management range from $22,207 for the 50-foot Oregon shrimp and crab vessel to $–4,462 for the 48-foot Northern California troll and crab vessel. Returns to labor, management, and investment are all positive and range from $27,087 to $2,032. Therefore, using the most generous measure of economic condition, returns to labor, management, and investment, two of the nine vessels are below most classifications of poverty levels.[5]

Economic condition cannot be effectively measured in isolation. A comparison of earnings often made by fishermen is between themselves and their crew. Table 4 illustrates the crew share per full-time crewman equivalent. This standardizes the different size crews and different length seasons among various vessels. It is the number of crewmen times months fishing divided by 11 working months per year. On four of the nine vessels the return to

[4] Variable costs include an opportunity cost for the operator's labor.

[5] Gillnetters ($2,032) are generally employed elsewhere in addition to fishing, and when incomes are combined may no longer fall in this category.

Table 3. Summary of Cost and Returns, Nine Above-Average Composite Pacific Northwest Fishing Vessels[1]

	80-ft. Wash. dragger	50-Ft. N. Calif. troll & crab	48-Ft. N. Calif. troll & crab	62-Ft. N. Calif. dragger	50-Ft. Oregon shrimp & crab	52-Ft. Wash. troll & crab	40-Ft. Oregon troll & crab	32-Ft. Oregon troll & crab	28-Ft. Oregon gill-netter
Investment	$87,000	$85,000	$81,600	$70,000	$61,000	$56,000	$40,000	$12,000	$9,755
Gross receipts	90,974	64,050	37,945	75,600	68,260	60,500	38,800	23,900	8,210
Variable costs									
Repairs	8,478	11,500	5,500	9,290	8,662	4,910	5,476	4,014	3,200
Crewshare	30,651	18,550	9,489	24,220	17,539	15,600	9,605	4,780	456
Other[2]	17,180	26,140	15,789	25,482	24,892	26,670	16,470	9,152	3,433
TOTAL	56,309	56,190	30,778	58,992	51,093	47,180	31,551	17,946	7,089
Fixed Costs									
Interest[3]	5,058	7,650	6,936	5,600	4,880	5,040	3,600	1,080	878
Insurance	4,127	4,250	5,904	3,500	3,400	3,360	2,300	450	125
Depreciation	5,620	4,250	5,440	3,500	3,050	2,800	2,000	550	481
Other	20,150	4,865	4,729	9,779	2,816	3,455	1,148	1,719	937
TOTAL	34,955	21,015	23,009	22,379	14,146	14,655	9,048	3,799	2,421
Total Cost	91,264	77,205	53,787	81,371	65,239	61,835	40,599	21,745	9,510
Gross Receipts Less Total Cost	–290	–13,155	–15,842	–5,771	3,021	–1,335	–1,799	2,155	–1,300
% Return to Investment[4]	5.5	–6.5	–10.9	–0.2	12.9	6.6	4.5	27.0	–4.3

[1] Source: Marine Economics Data Sheets, Oregon Marine Advisory Program.
[2] Includes opportunity cost for the operator.
[3] Opportunity cost (interest) on the average investment.
[4] (Gross Receipts – Total Cost + Interest)/Investment × 100 = % Return to Investment.

Table 4. Return to Labor, Management, and Investment; Operator Opportunity Cost, and Crewshare per Full-Time Crewman Equivalent for Nine Composite Above-Average Pacific Northwest Fishing Vessels[1]

	80 Ft. Wash. dragger	50 Ft. N. Calif. troll & crab	48 Ft. N. Calif. troll & crab	62 Ft. N. Calif. dragger	50 Ft. Ore. shrimp & crab	52 Ft. Wash. troll & crab	40 Ft. Ore. troll & crab	32 Ft. Ore. troll & crab	28 Ft. Ore. gill-netter
Return to labor, management, and investment	$20,047	$13,745	$ 2,474	$15,861	$27,087	$21,855	$13,441	$ 9,694	$ 2,032
Return to labor and management[2]	14,989	6,095	–4,462	10,261	22,207	16,815	9,841	8,614	1,154
Operator opportunity cost[3]	15,279	19,250	11,380	16,032	19,186	18,150	11,640	6,459	2,463
Return to management[4]	–290	–13,155	–15,842	–5,771	3,021	–1,335	–1,799	2,155	–1,300
Crew share per full-time crewman equivalent[5]	6,811	20,611	13,556	8,970	19,949	12,000	8,732	9,560	4,560

[1] Derived from Marine Economics Data Sheets, Oregon Marine Advisory Program and Fishermans' Marketing Association of Washington, Inc.
[2] Algebraic sum of operator opportunity cost and return to management.
[3] This is a share of the gross receipts as specified for the fishermen for each type vessel.
[4] Analagous to Gross Receipts less Total Costs from Table 3.
[5] Full-time crewman equivalent = [(no. men in crew) (months fishing)]/11 months.

operator labor *and* management is less than crewshare per full-time crewman equivalent. For three other vessels it is very nearly the same and for the remaining two vessels the operator is earning considerably in excess of crewmen.

Nine British Columbia Vessels. As indicated previously, Campbell and others have estimated costs and returns for nine selected B.C. vessels. They are not intended to represent a typical or average vessel and the data are largely estimates. Nevertheless, the data are useful in providing a more complete economic description of Pacific Northwest vessels. Table 5 provides a summary of costs and returns for the nine vessels. Returns to labor, management, and investment range from $9,827 for a $15,000 gross gillnetter (which is atypically large) to $–4,221 for $10,000 gross salmon seiner (atypically small). Return to labor and management are extreme for the same vessels and return to management is lowest for the $20,000 gross seiner ($–11,143) and highest for the $15,000 gross gillnetter ($4,326).

Comparisons with Other Businesses and Professions. Table 6 provides a ranked comparison of fishermen returns to labor and management with 17 selected categories of production and professional workers. Although fishermen are investors as well as workers and managers in their own business, returns to labor and management (opportunity cost of investment is deducted) are comparable to wage earnings of various other production and professional workers. As shown in Table 6, fishermen fare considerably better and considerably worse. Part of the difference in distribution is attributable to different sample sizes, but part is also attributable to skill and other characteristics of commercial fishing.

There is a conspicuous concentration of fishing vessels at the bottom of the ranking. As indicated previously, the

Table 5. Summary of Costs and Returns, Nine British Columbia Fishing Vessels[1]

	$10,000 Gross salmon seiner	$20,000 Gross salmon seiner	$30,000 Gross salmon seiner	$5,000 Gross gill-netter	$10,000 Gross gill-netter	$15,000 Gross gill-netter	$5,000 Gross salmon troller	$10,000 Gross salmon troller	$20,000 Gross salmon troller
Investment	$38,000	$45,000	$50,000	$ 5,400	$10,500	$14,300	$10,000	$20,000	$40,000
Gross receipts	10,000	20,000	30,000	5,000	10,000	15,000	5,000	10,000	20,000
Variable costs	10,246	17,318	24,427	2,250	2,990	3,725	2,350	4,075	6,750
Fixed costs	3,975	4,675	5,175	655	1,188	1,448	1,050	2,125	4,150
Return to labor, management, and investment	–4,221	–1,993	398	2,095	5,822	9,827	1,600	3,800	9,100
Opportunity cost of investment	2,660	3,150	3,500	378	735	1,001	700	1,400	2,800
Return to labor and management	–6,881	–5,143	–3,102	1,717	5,087	8,826	900	2,400	6,300
Opportunity cost of labor	3,000	6,000	9,000	1,500	3,000	4,500	1,500	3,000	6,000
Return to management	–9,881	–11,143	–12,102	217	2,087	4,326	–600	–600	300
Average gross receipts all vessels this type in fleet	29,600	29,600	29,600	4,900	4,900	4,900	5,100	5,100	5,100

[1] Campbell, Blake A., "Returns from Fishing Vessels in British Columbia, 1966, 1967, and 1968," Department of Fisheries and Forestry, Vancouver, B.C.

Table 6. Return to Labor and Management or Annual Wages, 18 Pacific Northwest Fishing Vessels and 17 Production and Professional Worker Categories[1]

Occupation	Return to labor and management or annual wages
50-ft. Oregon shrimper and crabber	$22,207
52-ft. Washington troller and crabber	16,815
80-ft. Washington dragger	14,989
National average, personnel directors	13,215
National average, electricians	12,220
National average, plumbers	10,868
National average, heavy construction workers	10,712
62-ft. N. California dragger	10,261
40-ft. Oregon troller and crabber	9,841
National average, accountants	9,367
National average, building contractors	9,168
$15,000 gross B.C. gillnetter	8,826
National average, aircraft workers	8,684
32-ft. Oregon troller and crabber	8,614
National average, paper and pulp mill workers	8,420
National average, boat building and repair workers	7,779
Washington average, production workers	7,764
California average, production workers	7,421
Oregon average, production workers	7,322
$20,000 gross B.C. salmon troller	6,300
National average, insurance salesmen	6,262
National average, post office worker	6,240
50-ft. N. California troller and crabber	6,095
National average, sawmill workers	5,772
$10,000 gross B.C. gillnetter	5,087
National average, seafood processing plant workers	4,561
National average, food store clerks	4,352
$10,000 gross B.C. salmon troller	2,400
$5,000 gross B.C. gillnetter	1,717
28-foot Oregon gillnetter	1,154
$5,000 gross B.C. salmon troller	900
$30,000 gross B.C. salmon seiner	–3,102
48-foot N. California troller and crabber	–4,462
$20,000 gross B.C. salmon seiner	–5,143
$10,000 gross B.C. salmon seiner	–6,881

[1] From U.S. Department of Labor, Employment and Earnings, Vol. 16, No. 11, May, 1970, and studies referenced in Tables 4 and 5.

$10,000 and $20,000 gross B.C. salmon seiners are below average size and are not as representative as the $30,000 gross seiner. The largest of these three, the $30,000 gross B.C. seiner, has a $–3,102 return to management and labor. Cost of fuel, repairs, gear, crew, taxes, interest on investment, etc., exceeded the $30,000 gross receipts by $3,102. Assuming no other source of income to the fisherman, it would be necessary to utilize part of the depreciation reserve and interest on investment for ordinary living expenses. The return to labor and management for the top three vessels listed in Table 6 are all greater than for other occupations listed.

As investors, Pacific Northwest fishermen again compare quite favorably and quite unfavorably with other businesses. Table 7 lists 51 businesses, including 25 Pacific Northwest and Northeast fishing businesses, and provides for each the return to depreciation, amortization, and interest on investment as a percentage of gross receipts. Most non-seafood businesses fall in the 1.4 to 8.5 percent range while seafood and especially fishing businesses are above or below these returns. Nine composite Pacific Northwest fishing firms obtained a return to depreciation, amortization, and interest on investment above 8.5 percent of gross receipts and six obtained a return below 1.4 percent. As with the return to labor and management data, the wider distribution of return to investment for fishing businesses relative to non-fishing businesses is partly due to differences in sample sizes. The non-fishing businesses in Table 7 are based on large nationwide samples which tend to neutralize the geographic, firm size, and management effects.

Other Fisheries. Although now over 13 years old, the Crutchfield-Zellner (19) study of halibut fishermen provides some revealing information on that fishery. The five-year average boat income beginning in 1953 (receipts less all expenses except interest on equity) was $2,579. This provided a 2.9 percent return on the average $87,000 halibut vessel investment in 1956. This $2,579 also had to cover the investment of owner time in repair and maintenance of vessel and gear. As Crutchfield and Zellner indicated, " . . . these figures . . . present a bleak picture of the economic position of the halibut fleet." Crutchfield and Zellner also observed that:

> "a). The average income from all sources for fishermen in the Deep Sea Fishermen's Union (halibut) is probably not above average U.S. family personal income before Federal income tax.
>
> "b). The average income per dependent for fishermen averaged over a 'poor' year and a 'good' year and corrected for age and income concept, is probably not above per capita personal income in the State of Washington.
>
> "c). Fishermen's income is very much more variable from year to year than are average U.S. family income and Washington State personal income per capita."

There is some evidence that this is no longer the case. Prices, and therefore landed values, have increased between 1956 and 1969 and the number of halibut vessels have dropped from 165 to 54 in Seattle. Distribution of the $3.65 million landed halibut value in 1956 among 165 fishermen provided each an average of $22,000 gross receipts. This compares with a distribution of nearly $5 million landed value among 54 vessels or $92,000 gross receipts per vessel (1969). Although gear and equipment costs have increased, crewshares have gone up, and vessel investment and insurance are greater, they have not kept pace with the increase in average value of landings per vessel. Therefore, it would appear that the halibut fishermen are in a better economic position now than at the time of the Crutchfield-Zellner study. This is consistent with recent observations of the International Pacific Halibut Commission.

With Puget Sound salmon fishing, the 1959-61 Crutchfield study (30) indicated fishermen profits[6] of $5,013 for purse seiners and less than $1,085 for gillnetters. All salmon landings by Puget Sound purse seiners are up by nearly 8 percent, salmon prices are up by nearly 20 percent and number of purse seiner licenses are down by 22 percent

[6] Taxable income from all sources with no opportunity costs included.

Table 7. Return to Depreciation, Amortization, and Interest on Investment as a Percentage of Gross Receipts, 51 Selected Seafood and Non-Seafood Businesses[1]

Business	%
57-ft. Nova Scotia stern dragger	36.6
86-ft. New Brunswick stern dragger	34.9
120-ft. Newfoundland steel side trawler	32.7
32-ft. Oregon troller and crabber	31.5
$20,000 gross B.C. salmon troller	30.5
101-ft. Nova Scotia herring seiner	24.4
$10,000 gross B.C. salmon troller	23.0
60-ft. Prince Edward Island dragger	21.0
$5,000 gross B.C. salmon gillnetter	20.0
50-ft. Oregon shrimper and crabber	18.0
$5,000 gross B.C. salmon troller	17.0
80-ft. Seattle dragger	12.3
52-ft. Washington troller and crabber	11.6
National average, real estate agents and brokers	10.5
40-ft. Oregon troller and crabber	9.5
$2 million gross PNW seafood processor	9.0
National average, motels and tourist courts	8.5
$5 million gross PNW seafood processor-distributor	7.5
National average, funeral directors	6.7
$1.4 million gross PNW seafood processor	5.7
$4 million gross PNW seafood processor-distributor	5.4
National average, auto repair shops	5.4
93-ft. Prince Edward Island stern dragger	5.2
62-ft. N. California dragger	4.8
National average, trucking agencies	4.5
National average, insurance agents and brokers	4.2
National average, hardware retailers	4.0
National average, tire, battery, and accessory retailers	3.2
National average, ship and boat building and repair shops	3.1
National average, marine hardware, boat and supply retailers	3.0
National average, commercial feed lots	2.9
National average, restaurants	2.8
National average, lumber wholesalers	2.8
$9 million gross PNW seafood processor	2.8
National average, frozen food wholesalers	2.3
National average, fish and seafood wholesalers	2.2
National average, liquor retailers	2.0
National average, farm equipment retailers	2.0
National average, wine, liquor, and beer wholesalers	1.7
National average, grocery and meat retailers	1.6
National average, meat and meat product wholesalers	1.4
135-ft. Nova Scotia stern trawler	1.1
$56 million gross PNW seafood processor	0.9
28-ft. Oregon salmon gillnetter	0.5
50-ft. N. California troller and crabber	–1.5
$1 million gross PNW seafood processor	–2.6
$300,000 gross PNW seafood processor	–3.3
48-ft. N. California troller and crabber	–4.2
$30,000 gross B.C. salmon seiner	–16.2
$20,000 gross B.C. salmon seiner	–23.1
$10,000 gross B.C. salmon seiner	–43.7
121 wholesale, retail, and service firms with less than $250,000 assets	3.4

[1] Non-fishing business data were taken from: Annual Statement Studies, by Robert Morris Associates, Philadelphia National Bank Building, Philadelphia, Pa., 19107, and fishing business data were developed by the author. Since non-fishing business data are based on large nationwide samples and fishing business data are based on small localized samples, the former shows less deviation while the latter is characterized by considerable deviation.

from 1958-61 average to 1967-68 average. This would indicate a considerably improved economic condition for Puget Sound purse seiners except that costs are also significantly greater than they were in 1958-61. All salmon landings by Puget Sound gillnetters are up by 25 percent and prices are up nearly 20 percent but the number of gillnet licenses are also up by 8 percent. In addition, the gillnetters are subject to increases in costs (nearly 65 percent, but since they hire few if any crewmembers and sustain a much smaller investment than purse seiners, they can probably "get by" more easily.

A number of East Coast vessels are listed in Table 7, providing a direct comparison for that fishery. Carley (16) provides some information on 50 Georgia shrimp vessels. He reports an average income to owner of $4,942 and an income range of $2,743 to $20,480 for vessels 40 to 60 feet and over. Carley's "income to owner" is comparable to the return to operator labor, management, and investment as used previously in this study.

Although recent developments in the tropical tuna fishery have altered the situation considerably, Green and Broadhead (24) reported a range of profits from $–6,595 to $11,108, depending upon vessel capacity. Profit was illustrated as a linear positive function of vessel size beginning with 100-ton capacity up to a maximum of 500-ton capacity. The majority of vessels in the tropical tuna fishery are now over 350 tons and there are several over 800 tons. If the recent significant increase in total fleet capacity doesn't decrease the catch per unit of effort, the economic condition of the tropical tuna fishery should still be quite favorable relative to the Pacific Northwest fishery.

Economic condition of seafood processing and marketing firms

There are nearly 200 seafood processors in the Pacific Northwest exclusive of British Columbia. In Washington there were 219 processors and distributors, 67 in Oregon, and 21 in Northern California (exclusive of San Francisco) during 1969 (14). These firms vary in size from $300,000 gross income, privately owned, local plants to $30,000 gross income, integrated and diversified corporations. Very few of these more than 300 seafood processing and marketing firms are public corporations. The private nature of the business organizations and the high degree of resource and market competition to make internal financial information high in proprietary value. Therefore, the cost and earnings data available for determining the economic condition of these firms is scarce and incomplete. The following is based upon unaudited financial statements for eleven selected Pacific Northwest seafood processing and marketing firms.

A summary of costs and earnings for eight processors is provided in Table 8. Gross receipts less total costs ranges from $1 million to $–50,000 with an average of $294,000. Return to total assets vary from –5 percent to 16 percent and averages 6.04 percent. Profits for smaller firms tend to be overstated since they may be unincorporated, and financial statements do not account for unpaid family labor and the opportunity cost of equity. Also, much of the variation in percent return to total assets is due to different equity positions rather than differences in profit. Nevertheless, an average return to total assets of 6.04 percent is lower than the national average of 8.65 percent for manufacturing firms calculated on the same basis. It is lower than the percent return to total assets for a sample of 139 meat packing firms (8 percent), 46 flour mills (6.3 percent), 88 bakeries (9 percent), and 109 fruit and vegetable canners (6.6 percent), but is higher than dairy products firms

Table 8. Summary of Costs and Earnings for Eight Pacific Northwest Seafood Processors[1]

Item	Processor[2]							
	A	B	C	D	E	F	G	H
	(Thousand dollars)							
Total assets ($)	30,000	7,000	6,000	6,000	1,300	1,000	500	300
Gross receipts	56,000	9,000	9,000	6,800	2,000	1,070	1,400	300
Total variable costs	52,000	6,400	7,950	5,600	1,700	920	1,120	290
Total fixed costs	3,500	1,600	800	800	120	200	200	20
Total costs	55,500	8,000	8,750	6,400	1,820	1,120	1,320	310
Gross receipts less total costs	500	1,000	250	400	180	–50	80	–10
% Return to total assets[3]	1.67	14.29	4.17	6.67	13.85	–5.00	16.00	–3.33
% Return to gross receipts	.89	11.11	2.78	5.88	9.00	–2.60	5.71	–3.33

[1] Based on financial statements of eight firms, not all of which process the same seafoods. Figures are rounded to conceal identity of firms, but relative differences are held constant.

[2] The data for Processor A is an average of 1964, 1965, 1966, and 1967; the data for Processor B is an average of 1966 and 1967; Processor C an average of 1965, 1966, 1967, and 1968; Processor D an average of 1967 and 1968; Processor E, 1969; Processors F & G, 1968; and Processor H, 1964.

[3] Includes assets upon which interest is otherwise being paid. [(Gross Receipts – Total Cost) ÷ Total Assets] x 100 = % Return to Total Assets.

(4.2 percent), frozen fruit and vegetable manufacturers (3.3 percent), and animal feed manufacturers (5.5 percent) (3). Finally, 6.04 percent is less than the current market interest for this type of asset, a large part of which would be inventory of processed seafood and accounts receivable.

Profit as a percentage of gross receipts is also illustrated in Table 8 and averages 2.68 percent for the eight sample Pacific Northwest processors. This would rank the sample average processor between 35 and 36 in the list of 51 businesses of Table 7 and is below the national average of all wholesale, retail, and service firms and the average of such firms listed in Table 7 (3).

A number of seafood processors are also distributors, and several distributors conduct a limited amount of processing. Financial statements provide an inadequate picture of each function when the business both processes and distributes seafood. The three sample firms illustrated in Table 9 are primarily distributors and relatively homogeneous. These three distributors have higher gross receipts less total costs and higher percent return to total assets than the national average of distributors of comparable size. Likewise, the percent return to total assets is above the market interest rate for comparable assets. Earnings for the small distributor is probably overstated due to the use of unpaid (family) labor.

Opportunities for improvement

There are two basic opportunities for improving the firm's economic condition: 1) obtain higher prices per unit of product and 2) increase production relative to costs (or reduce costs relative to production). Higher prices are beneficial if demand is inelastic, *i.e.*, a price increase results in an increase in gross receipts. If demand for the product is elastic for the particular firm, a price increase, by itself, will not necessarily increase profits. Even if a price increase appears to be beneficial, the firm's ability to obtain an increase is constrained by its market power, relative bargaining strength, and the legal and political capability for joining with other firms in bargaining. Existing pricing activities were discussed earlier in this report. Fishermen-processor bargaining is limited by federal-state regulations and a lack of cooperation among fishermen. If it were legal and fishermen were well enough organized to affect a uniform price increase, there is still no assurance that their economic condition would be improved. New entrants into the fishery, attracted by the higher price, could force prices back down through increased production and force cost per unit of product up through increased resource exploitation, decreasing the catch per unit effort and competition for gear, crew, vessels, etc. The Pacific Northwest fishery provides several examples of this, *i.e.*, king crab.

Although some work has and is now being conducted on seafood demand elasticity (26), more must be learned regarding the effect of higher and varying prices upon seafood consumption and firm profits. Also, the relationship between industry economic condition and freedom of entry (given the common property nature of the resource) has been a lively topic of discussion and investigation (17, 23, 25). Nevertheless, realistic and applicable solutions to the freedom of entry and consequent lower catch per unit effort problem have been slow in forthcoming. Both of these problems (demand elasticity and freedom of entry) require greater resolution before a seafood product price increase can be considered as a panacea for the industry. Assuming some answers to these problems are found, investigations into methods of implementation would then be justified. This might include an examination of anti-trust laws, regulatory authority of states and their appropriate agencies, and the social and political barriers to industry organization.

An increase in production relative to costs provides a second opportunity for improving the economic condition of Pacific Northwest seafood firms. This requires an increase in efficiency of present plant, vessel, equipment, and labor and would logically be brought about through better in-plant or on-vessel management and skills. Means for increasing efficiency are common knowledge among the industry, yet there is a general lack of information demon-

Table 9. Summary of Costs and Earnings for Three Pacific Northwest Seafood Distributors and National Averages of 55 Seafood Distributors

	Pacific Northwest firms[1]				National averages[2] of			
	A (000)	B (000)	C (000)	Average of three firms (000)	55 Total (000)	10 Large (000)	26 Medium (000)	19 Small (000)
Total assets	$2,000	$2,000	$100	$1,367	$819	$2,916	$512	$136
Gross receipts	5,000	3,900	400	3,100	2,604	7,509	2,116	691
Total variable costs	4,350	3,300	340	2,663	NA	NA	NA	NA
Total fixed costs	350	400	30	260	NA	NA	NA	NA
Total costs	4,700	3,700	370	2,923	2,544	7,321	2,074	676
Gross receipts less total costs	300	200	30	177	60	188	42	15
% Return to total assets[3]	15.0	10.0	30.0	18.3	7.3	6.4	8.2	11.0

[1] Based on financial statements of three non-homogeneous firms for 1967. Figures are rounded to conceal identity of firms, but relative differences are held constant.

[2] From "Annual Statement Studies," Robert Morris Associates, 1969.

[3] Includes assets upon which interest is otherwise paid. [Gross Receipts − Total Cost) ÷ Total Assets] x 100 = % Return to Total Assets.

strating the economic advantage (or disadvantage) of implementing such measures. For example, shrimp fishermen know that netting more shrimp per trip will increase gear, vessel, and crew efficiency, yet this requires better biological and oceanographic knowledge for locating greater shrimp concentrations and an added cost/added return analysis of improved gear. The payoff to research efforts leading to such information and to an educational effort increasing the manager's ability to use such information would appear to be quite high.

Again, a potential depressing influence exists through freedom of entry, but this would probably be less serious than with price increases. Not only are increases in efficiency less conspicuous to potential entrants, they are probably more difficult for entrants to implement due to lack of specialized skills and managerial ability. Data in Tables 3 through 9 provide some clues to specific opportunities for improvement in the economic condition of Pacific Northwest seafood firms. As mentioned previously, profit is a function of price, cost, and volume, but it can also be correlated to other firm characteristics such as investment, gross receipts, and total cost. Some unweighted correlations are provided in Table 10 for heterogeneous fishing firms and in Table 11 for seafood processors. Correlation is the degree of statistical interdependence, a zero correlation coefficient implying no linear interdependency and a correlation coefficient of one implying complete linear interdependency. For the 18 fishing vessels used in this study, Table 10 indicates an inverse relationship between profit (return to management) and size as measured by investment, gross receipts, and costs. It should not be inferred that only smaller vessels make a profit. The correlation coefficients are not large and apply only to the 18 heterogeneous vessels of Table 3, the largest of which represents an $87,000 investment.[7] When non-salmon vessels are excluded, the correlation coefficients become more negative. This suggests that size may be more critical for salmon vessel profitability than for drag vessel profitability.

Correlation coefficients of seafood processor profit versus investment, gross receipts, fixed cost, variable cost, and total cost are all positive and more highly correlated with fixed cost than investment. Since salaries comprise the largest percentage of fixed cost it would appear that profitability in seafood processing is more highly correlated with

Table 10. Correlation Coefficients Among Various Characteristics of Pacific Northwest Fishing Vessels

	18 Vessels[2]	15 Salmon Vessels
	Profit[1]	
Investment	−.64	−.88
Gross receipts	−.22	−.53
Fixed cost	−.48	−.86
Variable cost	−.33	−.59
Total cost	−.39	−.69
	Investment	
Gross receipts	.85	.82
Fixed cost	.93	.97
Variable cost	.87	.84
Total cost	.92	.90

[1] Return to management.

[2] Includes the 15 salmon vessels.

[7] The reader is cautioned not to infer too much from these simple two-way comparisons. More data and more analysis are required before functional relationships can be estimated.

Table 11. Correlation Coefficients Among Various Characteristics of Eleven Pacific Northwest Seafood Processors

	Profit[1]
Investment	.45
Gross receipts	.39
Fixed cost	.63
Variable cost	.35
Total cost	.37
	Investment
Gross receipts	.99
Fixed cost	.97
Variable cost	.99
Total cost	.99

[1] Return to management.

management and supervisory salaries than with investment, as it is for the fishing vessels.

In addition to increasing firm profits through size changes and adjustments in organization, fishermen and seafood marketing firms can improve internal cost control and management. Tables 12 and 13 provide detailed cost schedules for three typical Pacific Northwest fishing vessels and three typical seafood processors. In general, three-fourths of vessel costs are variable and one-fourth fixed.

Table 12. Cost Schedule for Three Pacific Northwest Fishing Vessels[1]

	52-ft. Westport troll & crab vessel		50-ft. Coos Bay shrimp & crab vessel		62-ft. Eureka drag vessel	
	$	% of total cost	$	% of total cost	$	% of total cost
Variable Costs						
Vessel repairs	2,020	3	2,320	4	7,000	9
Gear repairs	2,890	5	6,342	10	2,290	3
Fuel	1,260	2	1,814	3	3,500	4
Galley	2,470	4	1,701	3	2,500	3
Transportation	1,820	3	1,631	2	950	1
Bait	2,800	4	560	1	.....	..
Ice	170	1	.....	..	2,500	3
Crewshare	15,600	25	17,539	27	24,220	30
Operator share	18,150	29	19,186	29	16,032	20
Total variable	47,180	76	51,093	78	58,992	73
Fixed Costs						
Interest on investment	5,040	8	4,880	7	5,600	7
Insurance	3,360	5	3,400	5	3,500	4
Depreciation	2,800	4	3,050	5	3,500	4
Interest on operating capital	2,552	4	1,813	3	2,524	3
Licenses	·263	1	120	1	75	..
Moorage	100	..	100	..	409	1
Property tax	140	1	30	..	84	..
Miscellaneous	400	1	753	1	6,687[2]	8
Total fixed	14,655	24	14,146	22	22,379	27
Variable plus fixed	61,835	100	65,239	100	81,371	100

[1] Based on Marine Economics Data Sheets, Oregon State University Marine Advisory Program.

[2] Includes $3,527 Social Security and unemployment and $2200 dues.

Although crewshare and operator share comprise over half of total costs, opportunities for reducing this item are limited. The crew and the operator receive wages based upon a percentage of gross receipts and competition for qualified crewmembers has been quite high in recent years. Gear and vessel repair costs appear to provide the best opportunity for cost control on fishing vessels with insurance costs a close second. These three items are frequently mentioned by fishermen and probably deserve increased attention by researchers.

According to Table 13, raw product is the largest cost item for seafood processors. Next in importance is processing labor and these costs combined comprise over 80 percent of total cost. Obviously, raw product purchasing is critical to the processing firm and the efficiency of processing labor is important. Processing labor is frequently paid

Table 13. Typical Cost Schedule for a Small-, Medium-, and Large-Size Pacific Northwest Seafood Processor[1]

	Small processor[4]		Medium processor[4]		Large processor[2]	
	$ (000)	% of total cost	$ (000)	% of total cost	$ (000)	% of total cost
Variable Costs						
Raw product	460	76	886	62	6751	83
Processing labor	66	11	258	18	424	5
Supplies	27	4	60	4	[5]	....
Commissions	5	1	[5]	....	49	1
Vehicles	8	1	13	1	[5]	....
Freight	2	....	45	3	138	2
Repairs & maintenance	3	1	26	2	8	....
Total variable	571	94	1288	90	7370	91
Fixed Costs						
Salaries	[3]	....	42	3	126	2
Depreciation	4	1	19	1	65	1
Interest	1	....	14	1	59	1
Insurance	3	1	7	1	58	1
Professional services	3	1	4	....	15	....
Utilities	7	1	22	2	30	....
Taxes (excl. income)	9	1	3	....	91	1
Storage	[5]	....	17	1	98	1
Miscellaneous	8	1	14	1	213	2
Total fixed	35	6	142	10	755	9
Variable Plus Fixed	606	100	1430	100	8125	100

[1] Based on actual financial statements of a typical firm in each size category. Figures are rounded to conceal identity of firms, size classified by value of assets, $0-$750,000 = Small, $750,000-$1,500,000 = Medium, over $1,500,000 = Large.

[2] Taken from 1964 data and adjusted to 1968 price levels, USDI, BCF C.F.S. No. 5000.

[3] Included in processing labor.

[4] 1968 data.

[5] Figures included in other categories.

on a per unit of product basis rather than on a per unit of time basis. This mitigates to some extent efforts at processing labor cost control.

Because of the high percentage of variable relative to fixed costs for both fishermen and processors, opportunities for improved economic conditions appear to be greater through better internal management than through changes in size and/or investment, provided the firm is already in the relevant range with respect to size.

Summary

Pacific Northwest fishermen operate competitive, small, independent firms under varying and frequently conflicting regulations. They must deal with small, isolated, high-cost gear and vessel repair and supply firms and with strong independent and/or corporate seafood processors. Pacific Northwest fishermen are looked upon as high-risk, low-return businesses by lenders and insurance firms.

Returns to management for nine above-average composite Northern California, Oregon, and Washington vessels range from $–15,842 to $3,021. Returns to labor and management range from $–4,462 to $22,207, and returns to labor, management, and investment range from $2,032 to $27,081. These returns are generally higher than for longliners, trawlers, draggers, and seiners operating in the northwest Atlantic and generally lower than returns to

Georgia shrimp vessels. This was not unexpected since the nine composite vessels represent above-average operations for their specific class and area while data from other studies generally represent an average of vessels in each class. Although six of the nine composite vessels produced a return to labor and management greater than the average wage for all California, Oregon, and Washington production workers, only three vessels produced a return greater than a national average of personnel directors and only one of nine produced a return greater than the vessel's own crew earnings. Return to labor and management and return to investment for the nine composite Northern California, Oregon, and Washington vessels and the nine B.C. vessels do not appear sufficient in an absolute sense to attract new entrants into these fisheries, especially when the high level of risk characteristics of the industry and the high degree of skill required are taken into consideration. Some Pacific Northwest fishermen are obtaining a standard of living as high as loggers, construction workers, teachers, and even accountants. At present, sufficient data are not available to substantiate this, but the majority of Pacific Northwest fishermen are probably in a less favorable economic condition than other laborers, managers, and investors with comparable abilities and capital. Again, this is probably disguised by the fact that the nine composite fishing firms used in this study are above-average operations.

Although profits for 18 composite Pacific Northwest fishing vessels are negatively correlated with various measures of size, the correlation is more significant when only salmon or salmon-combination vessels are included. Opportunities for improving the economic condition of fishing firms exist through better cost control of such items as gear repair, vessel repair, and insurance and through greater efficiency (catch/unit effort). Price increases may prove beneficial with appropriate improvements in controlling total resource exploitation and improved understanding of demand elasticity.

Processors and distributors operate under less complicated state and federal regulations, but must contend with variable raw product supplies, variable raw product quality, unionized but relatively immobile labor supply, and an unpredictable retail market. Nevertheless, the eight processors for which data are available are earning slightly less, on the average, than other types of comparable firms throughout the United States. The three sample distributors are earning more than a national average of 55 distributors. Opportunities for improvement appear to include better control of raw product purchasing and increased efficiency of in-plant labor.

Processor profits are positively correlated with various measures of size, especially fixed costs. Salaries comprise a large portion of fixed costs which may imply that investment in top-quality management and supervisory personnel is profitable.

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