MFR PAPER 1130

An Analysis of Prices Paid to Fishermen Before and After the Establishment of a Fishery Cooperative

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INTRODUCTION

"A fishery cooperative consists of a group of individual fishermen acting together for mutual benefit and is designed to accomplish group objectives" (Smith, 1974). These group objectives are primarily economic in nature and often directly related to the prices paid to the fishermen for their catch. Common motivations to create fishery cooperatives include excessive price fluctuations, weakness of prices at the primary producer level, and/or insufficient storage and processing facilities.

This paper reports the findings of a case study which compared the prices received by fishermen prior to and after the establishment of a unique fishery cooperative organization.

BACKGROUND

In January, 1965 the Federal-Provincial Conference on Fisheries Development in Ottawa, Ontario included discussions on the marketing problems facing the inland freshwater fish industry of Canada. These deliberations led to the establishment of the Inter-Governmental Committee on Marketing Organization for the Freshwater Fisheries, which later became the Sub-Committee of the Federal-Provincial Prairie Fisheries Committee on Marketing Organization. This subcommittee was charged with the responsibility of evaluating the feasibility of adopting marketing board techniques within the industry. Its recommendations resulted in the formation of the Commission of Inquiry into Freshwater Fish Marketing under the leadership of George H. McIvor. The charge to the Commission read:

> The Commission is hence instructed to inquire into and report upon the possibility of better coordination which will achieve more orderly marketing . . . and report upon whether the current marketing situation warrants an export monopoly, whether persons and organizations involved in the marketing process want organized marketing; and whether an export monopoly or marketing board technique of selling can work for marketing freshwater fish (McIvor, 1965).

Finally, based upon the findings of the McIvor Commission, the Senate and House of Commons on 27 February 1969 passed legislation creating a Crown corporation named the Freshwater Fish Marketing Corporation.

The Corporation was established as the sole interprovincial and export seller of the products of the commercial freshwater fisheries of the provinces of Manitoba, Alberta, and Saskatchewan, the Northwest Territories, and the northern portion of Ontario. The objectives of the Corporation, as established by law, are: a) the marketing of fish in an orderly manner; b) increasing returns to fishermen; and c) promoting international markets for, and increasing inter-provincial and export trade in, fish (Acts of the Parliament of the Dominion of Canada, 1969).

Products

The primary species of the Canadian freshwater fishery are whitefish, pickerel, pike, sauger, and trout. In 1968 these five species accounted for roughly 37 percent of the total commercial landings of freshwater fish in Canada, and over 62 percent of its landed value (Anonymous, 1972). Other species indigenous to the freshwater fishery include tullibee, perch, goldeye, mullet, cisco, sucker, redhorse, turbot, sheepshead, and buffalo fish. Historically, these species have been of low commercial value and at best considered by-products of fishing for the higher priced species. Many of these underutilized or underexploited species are available in abundant supply.

Markets

The Canadian freshwater fishery is heavily dependent on export markets for the sale of its products. More than 80 percent of all commercial freshwater fish landings are exported and 95 percent of this volume flows to the United States.

OBJECTIVE

The objective of the study was to determine whether or not returns to fishermen have increased since the establishment of the Freshwater Fish Marketing Corporation. Three criteria were selected to evaluate the Corporation's efforts to increase returns to

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fishermen. These criteria are: a) changes in average prices received by fishermen for the combined landings of the five primary species; b) changes in average prices received by fishermen for the combined landings of all species; and c) changes in the percentage of export price paid to fishermen.

PRICES RECEIVED BY FISHERMEN

Prices received by fishermen, which are best measured in terms of real landed price per pound, can be analyzed both by species and by province. Since the primary concern is to determine if fishermen are receiving greater overall returns per pound in the total area under the jurisdiction of the Freshwater Fish Marketing Corporation, changes in prices for particular species or in specific provinces will not be considered. Therefore, analysis will be restricted to a) the average real prices per pound received by fishermen for the combined landings of the five primary species in the participating provinces, and b) the average real prices per pound received by fishermen for all species landed in the participating provinces.

In order to determine if landed value per pound increased following the creation of the Corporation, the following null hypotheses were tested:

1) The average real price per pound paid to fishermen for the combined landings of pickerel, sauger, trout, and whitefish harvested in Ontario, the prairie provinces, and the Northwest Territories was not higher following the establishment of the Freshwater Fish Marketing Corporation than before it was created.

2) The average real price per pound paid to fishermen for the combined landings of all species harvested in Ontario, the prairie provinces, and the Northwest Territories was not higher following the establishment of the Freshwater Fish Marketing Corporation than before it was created.

Defining μ_1 as the mean real price per pound paid to fishermen for the combined landings of the five primary species of Ontario, the prairie provinces, and the Northwest Territories before the Corporation was established, and μ_2 as the mean real price per pound paid to fishermen for the combined landings of the five primary species in Ontario, the prairie provinces, and the Northwest Territories after the Corporation was created, the first null hypothesis can be stated H_0: $\mu_1 - \mu_2 \geqslant 0$, with the associated alternative hypothesis H_1: $\mu_1 - \mu_2 < 0$. Similarly, defining μ_3 as the mean real price per pound paid to fishermen for the combined landings of all species in Ontario, the prairie provinces, and the Northwest Territories before the Corporation was established, and μ_4 as the mean real price per pound paid to fishermen for the combined landings of all species in Ontario, the prairie provinces, and the Northwest Territories after the Corporation was created, the second null hypothesis can be stated H_0: $\mu_3 - \mu_4 \geqslant 0$, with the associated alternative hypothesis H_1: $\mu_3 - \mu_4 < 0$.

The t-test of the difference between two means was used to test the null hypotheses. The assumptions of this test are: a) the real prices are random variables from normal populations, and b) the variances of the parent populations are equal. In this case a further assumption must be made; namely, that neither the means nor the variances of the parent populations are a function of time. This assumption is supported by the results of multiple regression analysis which indicated that time trend, price in the previous year, and landed pounds were all poor indicators of the average real price of fish for any given year.

To test the two null hypotheses, the appropriate mean real price for the three years prior to the establishment of the Corporation was compared to the mean real price for the three years after establishment of the Corporation (Table 1). Therefore, each test had four degrees of freedom.

As Table 2 shows, the first null hypothesis could be rejected at the 0.148 level of significance. This indicates that the change in average real price per pound paid to the fishermen for the combined landings of the five primary species after the Corporation began operations is not statistically significant at a reasonably low level of significance. Therefore, the null hypothesis $\mu_1 - \mu_2 \geqslant 0$ cannot reasonably be rejected. In other words, it cannot be concluded that the average real price per pound fishermen received for the five primary species increased after the Corporation was established.

Table 2 also shows that the second null hypothesis could be rejected at the 0.005 level of significance. This

Table 1.—Index of prices received by fishermen, 1966-1971 (1935-1939 = 100) (values in cents per pound)

		Five Primary Species		All Species	
Year	Wholesale price index	Average landed value per pound	Deflated Average landed value per pound	Average landed value per pound	Deflated average landed value per pound
1966	259.5	21.1	8.13	12.2	4.7
1967	264.1	16.9	6.40	11.1	4.2
1968	269.9	18.8	6.97	11.3	4.2
1969	282.4	22.6	8.00	13.1	4.6
1970	286.4	21.6	7.54	14.8	5.2
1971	289.9	20.3	7.00	16.2	5.6

Source: Canada, Department of the Environment, Intelligence Services Division, Marketing Services Branch, Fisheries Service, *Annual Statistical Review of Canadian Fisheries*, Vol. 4, 1972.

Table 2.—Results of t-Test*

	$\bar{X}_1$	$\bar{X}_2$	$s_{\bar{X}_1-\bar{X}_2}$	Computed t	Significance probability**
Avg real price/lb for the 5 primary species	7.15	7.51	0.300	−1.20	0.148
	$\bar{X}_3$	$\bar{X}_4$	$s_{\bar{X}_3-\bar{X}_4}$	Computed t	Significance probability**
Avg real price/lb for all species	4.36	5.13	0.169	−4.55	0.005

*Values used to compute $\bar{X}_1$, $\bar{X}_2$, $\bar{X}_3$, and $\bar{X}_4$ can be found in Table 1.

**Significance probabilities reported in Table 2 correspond to the minimum levels of significance for which the associated null hypotheses could be rejected.

X_1 = The sample mean of average real prices per pound for the primary species for the three year period before the Corporation was created.

X_2 = The sample mean of average real prices per pound for the primary species for the three year period after the Corporation was created.

X_3 = The sample mean of average real prices per pound for all species for the three year period before the Corporation was created.

X_4 = The sample mean of average real prices per pound for all species for the three year period after the Corporation was created.

$s_{\bar{X}a-\bar{X}b}$ = the estimated standard error of the difference between the two means.

indicates that the change in average real price per pound paid to the fishermen for the combined landings of all species after the Corporation began operations in 1969 is statistically significant. Therefore the alternative hypothesis $\mu_3 - \mu_4 < 0$ is to be accepted. In other words, it can be concluded that the average real price per pound paid to fishermen for species other than the five primary species increased after the Corporation was created.

A possible explanation of why average real prices increased for other species, but not for the five primary species, is that species of fish previously not commercially exploited are now being introduced on the market in new product forms. These essentially new products command a higher market price which can ultimately be passed back to the fishermen.

This explanation, although tentative, is supported by findings previously presented elsewhere (Lamb, 1974). For example, prior to the creation of the Corporation, processing operations in the industry were limited to simple filleting. The Corporation, on the other hand, has invested in expensive, sophisticated machinery and equipment which is capable of performing a variety of technologically advanced processing operations. This new production capacity combined with large, modern cold storage facilities and the Corporation's expansion into the convenience food market has made the underutilized species more desirable, thus more profitable to the fishermen. The five primary species, which were previously considered the mainstay of the industry, have continued to be marketed primarily whole and filleted. Since these products are marketed in essentially the same form as before the corporation was created, their real price per pound has not increased.

PERCENT OF EXPORT PRICES PAID TO FISHERMEN

The third criterion selected to evaluate the Corporation's efforts to increase returns to fishermen is a comparison of the percentage of export prices paid to fishermen before and after the Corporation began operations.

For the 3-year period prior to the creation of the Corporation, fishermen in the participating provinces received an average of 69 percent of the export price of fish. For the 3-year period following the creation of the Corporation, fishermen in the participating provinces received an average of 67.4 per cent of the export price of fish (Anonymous, 1972). In other words, the percentage of export prices paid to the fishermen decreased slightly after the Corporation was created.

One possible explanation why the Corporation has not increased the percentage of the export price paid to fishermen might be that marketing costs have not changed; therefore the percentage of export prices paid to fishermen has not increased. This is a weak argument however, because one of the reasons the Corporation was created was to reduce the margin between prices to fishermen and export prices. The McIvor Commission noted:

> There is a large spread between the price received by the exporter-processor and the price paid to the fisherman . . . The Commission finds that on average the spread is excessive because handling, processing and storing are inefficient (McIvor, 1965).

It is therefore concluded that, regardless of the reason, the Corporation has failed to reduce the margin between prices paid to fishermen and export prices. This is clearly an area for more detailed study by the Corporation.

SUMMARY

In sum, the change in average landed price per pound for all species since the Corporation began operations in 1969 is statistically significant. Fishermen have benefited from the Corporation's development of markets for previously underutilized species. Prices paid the fishermen for these species have increased, apparently as a result of advanced processing techniques the Corporation has adopted and its development of markets for these species in new product forms.

Two areas are apparent where the fishermen are not better off than they were prior to the establishment of the Corporation. Landed price per pound for the five primary species did not significantly increase after the creation of the Corporation, and the percentage of export price received by the fishermen did not increase. The available data fail to suggest why these benefits were not forthcoming[1].

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[1]For further information concerning the impact of the Freshwater Fish Marketing Corporation on the marketing system and particularly its benefits to fishermen, see: Lamb, Charles W., Jr. and D. F. Mulvihill, "The Freshwater Fish Marketing Corporation of Canada," Institute for 21st Century Business, Kent State University, Kent, Ohio, 1974; and Lamb, Charles W., Jr., "A Comparative Analysis of Marketing Systems for Canadian Freshwater Fish," in "National Needs & Ocean Solutions: Proceedings of the Tenth Annual Conference," Marine Technology Society, Washington, D.C., 1974, pp. 1029-1038.

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