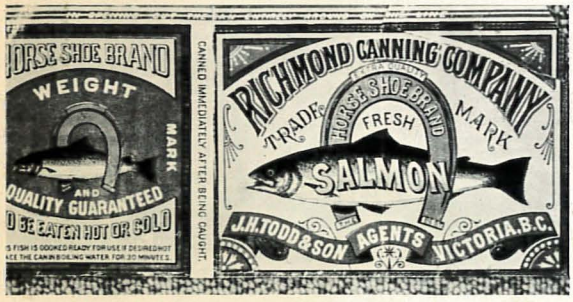
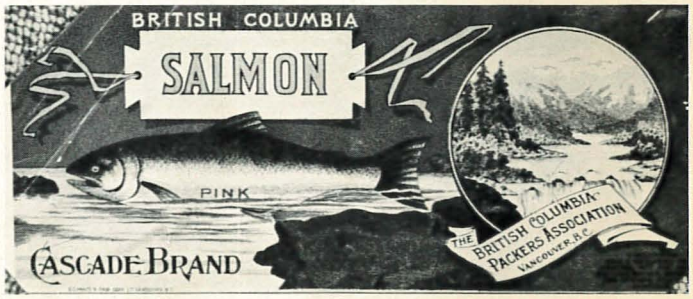
The Development of the Fraser River Salmon Canning Industry, 1885 to 1913

by David J. Reid





...S AND SOCIOLOGY UNIT– NORTHERN OPERATIONS BRANCH – FISHERIES & MARINE SERVICE – PACIFIC REGION

DEPARTMENT OF THE ENVIRONMENT NOS/ECON 4 73

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FOREWORD

An historical review of developments which took place in the past is often very valuable for two reasons. First, it provides an opportunity to review past decisions and developments in the light of today's values. Second, it affords individuals the opportunity to avoid mistakes which were made in the past. An historical review of past patterns and developments is particularly important to managers of resources where the speed of exploitation over time is of critical importance. It is these resources which give rise to the serious social and economic problems of depletion. These are also the resources which are usually managed under constraint of a great deal of uncertainty. For instance, in the case of the salmon fishery resource of British Columbia, there is not always a complete understanding of the absolute stock sizes available for harvesting, about the ability of particular stocks to renew or rejuvenate themselves, nor the proper institutional framework around which the satisfactory policy can be initiated and maintained. In my opinion David Reid, in this study, provides valuable insight on past patterns and developments in the west coast salmon industry. In doing so he has put some of today's problems in a better historical perspective. Many of the problems which appear to defy solution in the salmon industry of today also appeared insoluble during the period examined in this paper. Questions about the size of the fleet, foreign control of fishing operations and resource protection are no less critical than they were in the late 1800s.

Nothing sinister is implied about the fishing companies that eventually gained control of the industry. The behaviour the canning companies displayed was not inconsistent with the times, nor as David Reid argues, did it work to the disadvantage of the Canadian people. In fact, it is David Reid's contention that the institutional framework developed during that period may have worked towards a more socially desirable level of resource conservation in spite of a large amount of uncertainty. The institutional framework around which the salmon

fishery developed appears to have done in the past much of what is intended by the salmon vessel licence programs today. The attempt by fishing companies to increase their profit by controlling input markets was tempered by the establishment of a strong fishermen's union and the independent action of government. Whether another type of structure would have led to greater economic efficiency or to a more socially desirable distribution of fishing income is still unclear. However, one need only examine other salmon fisheries on the west coast of the mainland United States and Alaska to recognize that Canada's west coast salmon fishery has fared fairly well over the years.

The amount of control foreign interests had over the fishing industry seems to have increased during this period. However, this is not surprising given the fact that the main markets for British Columbia salmon were in Great Britain and the United States. British Columbia, for the most part, was isolated from eastern Canadian markets and the amount of investment capital in Canada was probably very limited. In any case, foreign control of Canada's resource based industries was not uncommon at the time nor is it particularly uncommon today. The important point is that foreign money helped develop the industry as it is and in some respects it appears as if foreign capital provided the vehicle by which a relatively stable pattern of development took place. So while many might consider foreign participation in our fishing industry unfortunate, it appears as if it was necessary if fishing companies were to succeed in the early stages of development.

Although this study refers specifically to the Fraser River salmon canning industry, the conclusions of the report apply to the whole British Columbia coast and in particular to the Northern Operations Branch region. Ownership of the northern plants was vital to the material strength of the new corporations. For the northern canneries had shown historically much larger profits per case than those on the Fraser. Any company, therefore, wishing to control the Fraser River fishery would be financially stronger if it also possessed northern plants. It is

clear for example, that the BC Packers' merger would have failed to materialize if northern plants could not have been included in the plans. Apart from its control of the Fraser River pack, that company was heavily represented at Rivers Inlet, on the Skeena River and had outlying plants at Bella Coola, Lowe Inlet and Princess Royal Island.

Many descriptive books utilizing historical data have been written about the history of the British Columbia salmon fishery. This is the first presentation of which I am aware that attempts to analyze the data available in its historical context. It is also the first presentation to encompass under a single cover much of the information and data available on the west coast fishing industry during that period. For this reason, this study should serve as a valuable reference for anybody interested in Canada's west coast salmon fishing industry.

The past is never dead for events of one era tend to recur in another. The need to revamp and redefine social concepts in the light of historical change always exists. This is a necessary part of our life and of our need to give human existence dignity despite individual error. It is my sincere hope that others who read this excellent piece of work will share with me the experience of gaining a better understanding of one of Canada's first and most important industries.

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PREFACE

The first commercial canning of salmon on the Fraser River took place in 1870. The industry grew until 1883 at which time the number of canning companies had reached thirteen and export sales exceeded one million dollars. However, between 1882 and 1886 there was a major recession in Europe precipitating a fall in the world market price of canned salmon. By 1885 export incomes had been cut to 20 percent of former levels and the number of operating canneries was halved.

The industry which re-emerged from the depression had little in common with anything that had gone before. In fact, in the late 1880s and early 1890s it is difficult to avoid the impression that we are witnessing experimentation on a grand scale. An impressed observer in 1870 remarked that "everything about the industry is new". The same remarks could well apply to the situation as it developed twenty-five years later.

By the 1890s large corporations had replaced the small businesses of the previous era. The vested interests of the Victoria merchants had been replaced by new corporate interests and the centre of economic activity in British Columbia had shifted to Vancouver. In 1888 legislation had been introduced to restrict fishing effort on the Fraser River and a system of licencing came into operation in 1889. Again, in a short space of time in the late 1880s a new system of hiring cannery labour, the Chinese contract system had become widespread. Finally, the 1890s saw the emergence of powerful fishermen's unions and the embryo of the movement towards co-operatives.

In such a complex scenario it is difficult to concentrate on one aspect without inevitably leaving a lot of loose ends. The objective of this study is restricted to an examination of the reasons for merger activity on the river. The viewpoint is that of a resource economist. What follows is a study of regulation of the fishery resource. Economic

theory tells us that resources can yield economic rents. However, under conditions of indefinite property rights and open access to all-comers, these rents are dissipated through wasteful competition. In the historical period under consideration, government regulation was largely ineffectual in limiting fishing effort. The position developed in this paper is that attempts at regulation were left largely to private interests as demonstrated in the emergence of large companies dating from the mid-1880s and the movement towards powerful unions in the 1890s. The rewards accruing from successful regulation of the fishery would be the capture of newly created economic rents.

Industrial concentration reached its peak in 1902 with the formation of BC Packers. This company certainly exercised a large amount of control over its input markets and thus was in a position to affect the level of fishing effort and the cost of the pack. How do we judge this situation? From the point of view of efficient resource allocation regulation of fishing effort was essential. The free competition exhibited in the late 1880s and again in the late 1890s was economically very wasteful. Creation of monopsony at the very least merely replaced one form of inefficient resource allocation with another. But more likely it had beneficial effects on the state of conservation of the Fraser River salmon resource.

In an environment of less than perfect competition, some comment on income distribution is necessary since adjustments are no longer entirely or uniquely determined within the economic system. Under such conditions, the magnitude and direction of adjustments are influenced by factors of social structure (e.g. the availability of information to various social groups), institutions (e.g. unions, employers' associations, etc.) and personality (e.g. the aspiration levels of various social groups). These are the factors which determine group bargaining power and thus income shares. This model, it is suggested, is appropriate to the Fraser River salmon canning industry after the mid-1880s. With respect to income distribution, this study presents only an intuitive and preliminary

statement. The important question is not whether groups become absolutely or relatively better or worse off over time. It is also important to determine how the various groups would have fared in the absence of the large corporations.

The study closes with the years leading up to 1913. By this time the effects of BC Packers on the Fraser River salmon canning industry had had time to work themselves out. Moreover, the years following 1913 saw Canada at war and this introduced a whole new set of circumstances the impact of which lies beyond the scope of this work. Finally, 1913 was a watershed year in the history of the Fraser River canning industry. A major disaster befell the fishery when the Fraser River at Hell's Gate was turned into a series of 'furious whirlpools' by the construction work on the Canadian Northern Pacific Railway. The obstacle prevented the year's large run from reaching some of the major spawning areas further upstream. As a result the pack of 1913 was of a size which has not been surpassed since.

Many people assisted in the preparation of this report and their help is gratefully acknowledged.

The report took final shape while I was working with the Economics Unit, Northern Operations Branch of the Fisheries and Marine Service in Vancouver. In particular, the study gained tremendously from the comments of William Sinclair. Early drafts were written while a part-time member of the faculty and a graduate student at Simon Fraser University. I owe a special debt to Don De Voretz of Simon Fraser who was an invaluable source of advice and encouragement.

Several people read and made comments on early drafts. The final work includes many of the suggestions made by John Boland of the Economics Unit, John Munro and Parzival Copes, both of Simon Fraser University and William Ross of Rutgers University.

A version of this paper was presented to the Canadian Histor-

ical Association at their Annual Meetings held at Queen's University, Kingston, Ontario in June, 1973. Isabel Anderson of the University of Saskatchewan was Chairman-Commentator of the session at which the paper was presented. Improvements suggested by Miss Anderson's comments and from the floor have been incorporated here.

Access to historical documents and data was provided by the University of British Columbia Library, Special Collections Division. The enthusiastic help of Judy Combs was sincerely appreciated.

Mr. C. H. Ashdown, Director of the Canadian Fishing Co. Ltd., and Mr. Pat Todd of Nelson Bros. Fisheries Ltd. very kindly gave their permission to use their companies' registered salmon canning labels as a cover design for the report.

Last, but by no means least, Sharon Walker of the Economics Unit typed and helped edit the final drafts.

Any errors and omissions remain my responsibility.

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July, 1973

1. Introduction*

The Fraser River drains an area of around 100,000 square miles and lies wholly within the province of British Columbia. The drainage system contains a great many lakes which, taken together, have a surface area of over 2,000 square miles. No other river basin on the Pacific coast of North America drains such a large area of river and lake waters so suitable for the rearing of salmon.

Five different species of salmon are to be found in British Columbian waters. Historically, of all species, the sockeye has been preferred by the canning industry. First and foremost, the high oil content, deep red colour and palatability of the flesh contributed to the sale of the product on the international market. Secondly, the fish ran in great shoals making large catches relatively easy. Finally, the sockeye were generally of a fairly uniform size and this permitted canning to become a standardised process.(1)

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* A version of this paper was presented to the Canadian Historical Association Annual Meetings, Queen's University, Kingston, Ontario, June 9, 1973.

(1) The preference for the sockeye was so decisive that little else was canned successfully until the early years of the twentieth century and indeed no separate pack figures were kept for other varieties before 1903. Only when the run of sockeye was particularly poor and the canners were faced with an excess supply of tin cans would they resort to canning other varieties. In the 'off' year of 1887, Wadham's Cannery (#20) packed some coho. See J. C. Lawrence, Early Salmon Canning Industry, Unpublished B.A. Graduating Essay, University of British Columbia, Special Collections Division, 1951, p. 23. Again in the poor sockeye years, 1899 and 1900, some canners were induced to pack pinks for marketing in the Orient. Canada, Parliament, House of Commons, Official Report of Debates, April 30, 1901, p. 4115. In 1900, 100,000 cases of chum were sent to South America. Canada, S.P., 1901, No. 22, p. xxxvii. Spring salmon were canned to the exclusion of other varieties during the earliest years of the Fraser River industry. However, on this basis, the industry was not too successful. Canada, S.P., 1893,

Between the late 1880s and the opening years of the twentieth century, fundamental changes took place in the structure of the Fraser River salmon canning industry of British Columbia. Up until the late 1880s the industry had been characterised by small firms, low levels of industrial concentration and a high incidence of local proprietorship and financing. However, by 1891 many formerly independent companies had disappeared through merger and three large firms - the Anglo-British Columbia Packing Company Limited (hereafter referred to as ABC Packers), Ewen & Co. and the Victoria Canning Company Limited - controlled over 70 percent of the pack of Fraser River sockeye salmon. There followed a lull in merger activity until 1897, after which there was a gradual build-up culminating in the incorporation in 1902 of the British Columbia Packers' Association of New Jersey Limited (hereafter referred to as BC Packers).(2) The new corporation had an authorised four million dollar capitalisation, absorbed twenty-two existing firms and in its first year of operation controlled over 50 percent of the Fraser River sockeye pack.(3) This merger also absorbed several earlier consolidations including the Victoria Canning Company Limited. By 1902 the character of the industry had been radically altered. Large corporations dominated an industry which now exhibited a high degree of industrial concentration. Moreover, the importance of local capital had declined. ABC

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(1) (cont.) No. 10c., op. cit., p. 60. Canning springs may have accounted for the failure of some of the earliest establishments, perhaps Holbrook & Co., for example, (#3). The ability to reject poor colour fish for canning through the operation of a saltery may have been the key to the survival of Ewen & Co. See H. Keith Ralston, The 1900 Strike of Fraser River Sockeye Fishermen, Unpublished M.A. Thesis, University of British Columbia, Special Collections Division, 1965, p. 20.

In 1905, 93 percent of the pack was sockeye and this is probably quite typical of the whole period stretching back to the late 1870s. By the end of the period covered by this study, in 1913, the pack of non-sockeye species had risen to over one quarter of the total reflecting a growing acceptance of other varieties in world markets.

(2) The British Columbia Packers Association of New Jersey was the predecessor company of the present day British Columbia Packers Limited. In the intervening period the company has changed names several times and in 1910 changed its registration from the U. S. to British Columbia.

(3) The statistics in this paragraph are computed from data contained in Canada, S.P., 1892, No. 11a, and 1904, No. 22.

Packers had its headquarters in the United Kingdom, the Victoria Canning Company was owned by the Welch-Rithet interests of San Francisco while BC Packers was backed by a consortium of eastern Canadian and American financial interests. Within little more than a decade, an important primary, export-oriented industry had passed in large part out of British Columbian hands. The record of firm disappearances through merger is given in Chart 1A, below, which is based on firm entry and exit data presented as Appendix I.

All the evidence suggests that the changes in the structure of the Fraser River salmon canning industry should be seen as a microcosm of a much larger movement taking place in the world's major industrialised countries.(4) The pattern of merger activity in the United Kingdom and the United States over the same period is presented in Chart 1B. The correspondence of the merger waves for the Fraser River salmon canning industry compared to the international picture is most striking. On the other hand, the correspondence is hardly surprising in light of the augmented role of international capital in the industry.

The major published work on the Fraser River salmon canning industry is Cicely Lyons, Salmon Our Heritage. Primarily written as a history of BC Packers by a former employee of the company the book is

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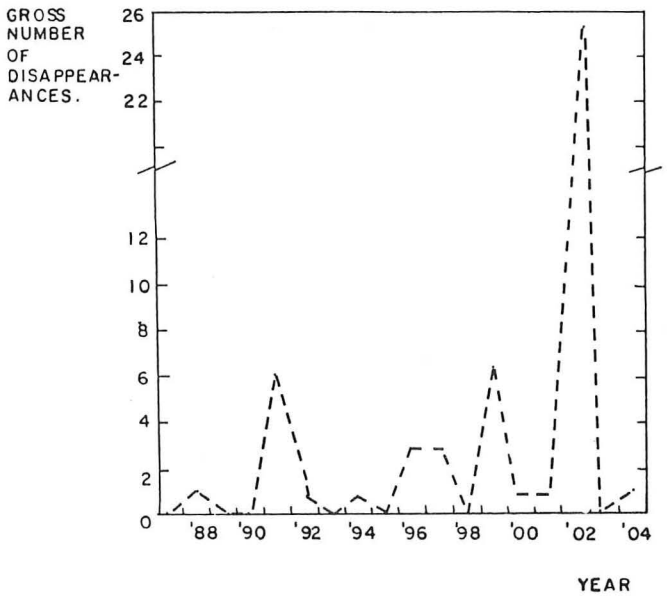
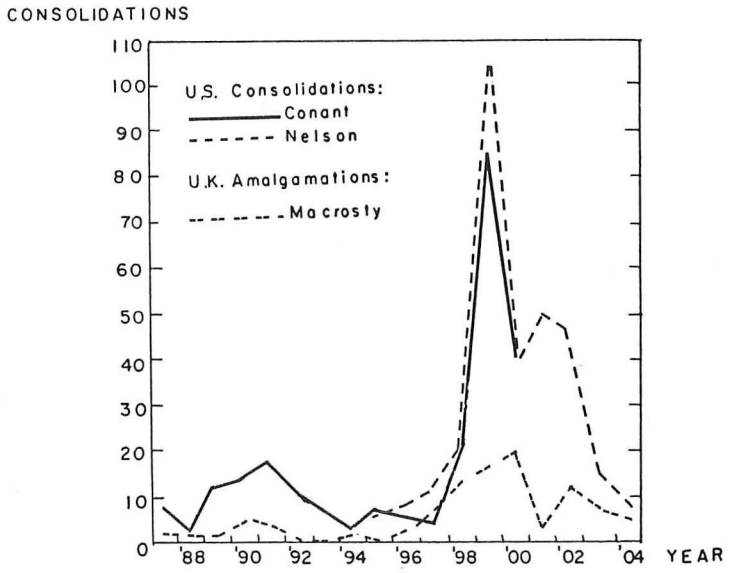
(4) Before the late 1880s there is no evidence of any period of intense merger activity in either the United Kingdom or the United States. For background on the merger movements in general, see Ralph L. Nelson, Merger Movements in American Industry, 1895-1956, N.B.E.R., Princeton University Press, Princeton, 1959. Also H. A. Shannon, "The Limited Companies of 1866-1883", Economic History Review, vol. IV, 1933 and H. R. Seager and C. A. Gulick Jr., Trust and Corporation Problems, Harper, New York, 1929. Between 1888 and 1892 there was a sudden surge of consolidations which in the United States gave birth to among others the American Tobacco Company (1890) and the General Electric Company (1892). This period of intense activity ended abruptly with the recession which began in 1893. Towards the end of the century the merger movement again gained momentum reaching new heights between 1898 and 1902. Horizontal mergers led to one firm holding a large share of the market in a wide variety of product lines....over 80 percent in such far ranging activities as electrical equipment, pneumatic tools, school furniture, matches and sugar. See Nelson, op. cit., pp. 161-2. Moreover, many earlier mergers appeared in these subsequent larger consolidations.

CHART 1

A. Firm Disappearances Through Merger in the Fraser River Salmon Canning Industry, 1887 to 1904.



B. Annual Series of United Kingdom and United States Consolidations, 1887 to 1904.



Sources: A. Appendix I.

B. Graph taken from Ralph L. Nelson, Merger Movements in American Industry, 1895-1956, N.B.E.R., Princeton University Press, Princeton, 1959, p. 128. The series depicted are those of Luther Conant, Industrial Consolidations in the United States, Publications of the American Statistical Association, 1901; Ralph L. Nelson, op. cit.; and H. W. Macrosty, The Trust Movement in British Industry, Longmans, London, 1907.

an excellent source of statistical material. The manuscript by the late Henry Doyle (1957), first president of BC Packers, whose work unfortunnately was unable to find a publisher is basically an historical chronicle of events and personalities in the early British Columbia salmon canning industry. Apart from the above, the most important contributions have been the theses and articles of Percy Gladstone (1950, 1953, 1959), and Keith Ralston (1965, 1968-69). Both authors have tended to concentrate on the history of industrial disputes in the fishing industry.

The major purpose of the present study is to examine the reasons for the merger activity in the Fraser River salmon canning industry described above during the period 1885 to 1913. It is generally agreed that changes in the capital market, corporation law and transportation technology have played an important historical role. The relevance of these factors in the case of the Fraser River salmon canning industry is discussed briefly in Section 2, below. What is potentially much more controversial, however, is the source of the new corporations' expected profits. Two major hypotheses can be put forward:

(i) the mergers were motivated by expected profits from exploitation of market power achieved by restricting competition,

or alternatively,

(ii) the mergers were motivated by expected profits from the achievement of internal economies of large scale production.

The main body of the paper is devoted to an evaluation of the relative importance of each of these possibilities in the eyes of the promoters of consolidation.

In Section 3, a simple economic model is constructed to represent the possibilities of a profitable merger based on market power, in particular based on the power to control the prices of inputs such as labour and raw fish. Such power to influence costs is referred to as

monopsony power.(5) The influence of internal economies of large scale production is ruled out by assumption, and the model leads directly to the delineation of a number of propositions which can be used to test the assertion that monopsony power was a major motive for merger.

In Section 4, these propositions are applied to the merger which resulted in the formation of BC Packers in 1902. The conclusions reached are as follows: the evidence gained from the original, surviving documents relating to the incorporation of BC Packers presented as Appendices II-V overwhelmingly supports the hypothesis of a monopsony-motivated merger. The five propositions derived from the model all yield positive results. A reformulation to check on the importance of internal economies of large scale production suggests that these were at best only a secondary reason for mergers.

In Section 5, the conclusions of a statistical study of size changes among companies over the years 1887 to 1909 are reported. Coefficients of industrial concentration are also worked out for a period of twenty years. The methodology is explained and the statistical calculations are made in a technical appendix, Appendix VI. The objective of the section is to shift attention away from expectations and towards the actual growth experience of the various salmon canning companies operating on the Fraser. The result is to lend weight to the previous work. No significant economies of scale are noted beyond the medium-small firm size. What dominates the picture is the relationship between changes in the size distribution of firms and the maintenance of high levels of industrial concentration.

Section 6 draws together the conclusions of the study and suggests some implications for both economic development and the management of the Pacific salmon resource.

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(5) Monopsony power is being used here perhaps in a rather loose sense. It subsumes the power to control entry of fishermen into the fishery and thus capture resource rents as well as the more exact sense of the term which suggests the ability to reduce factor payments below their contribution to total revenue.

2. Accommodating Factors and the Timing of Early Merger Activity

The timing of the early merger waves at the end of the nineteenth century is usually related to a number of accommodating factors which helped provide a suitable environment in which amalgamations could take place. Among these factors, changes in transportation technology, corporation law and financial institutions are emphasised most often in the literature.

The reduction in both overland and ocean freight rates, which took place in the years preceding the earliest merger wave, has often been cited as the main activating force in the North American merger movement.(6) Transcontinental railroads had been completed across both the United States and Canada by the 1880s while significant reductions in ocean freight rates based on improvements in both sail and steam technology proceeded throughout the period.(7) The argument runs in terms of producers amalgamating in order to eliminate the increased competition which resulted from the geographic expansion of firms' markets as transportation costs fell.

It is difficult to see how the transportation hypothesis applies to the Fraser River salmon canning industry. All the worlds' salmon canning areas were located along the Pacific Coast of North America from the Sacramento River in California north to Alaska. The major markets in Europe were reached by sailing ships around Cape Horn. Thus, changes in ocean freight rates could only have a marginal effect on the potential market area of one firm compared to another. The only market where there might have been significant cost changes favouring one producing area relative to another, lay in eastern North America. In this

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(6) Joe S. Bain, "Industrial Concentration and Government Anti-Trust Policy", in The Growth of the American Economy, H. F. Williamson, ed., Prentice-Hall, New Jersey, 1944, p. 710.

(7) G. S. Graham, "The Ascendancy of the Sailing Ship, 1850-1885", Economic History Review, Second Series, vol. IX, 1956, pp. 74-88. Also, D. C. North, "Ocean Freight Rates and Economic Development, 1750-1913", Economic History Review, Second Series, vol. XVIII, 1958, pp. 537-555.

case, rates on the all-Canadian transcontinental rail route were higher than on lines across the United States. However, this did little more than confirm the hold of Columbia River canners on eastern markets. For the eastern market had never been particularly important for Fraser River firms.(8) In short, it seems highly unlikely that an intensification of Fraser River firms' comparative disadvantage in serving a relatively minor market would have any serious impact on industrial structure.

Perhaps of more immediate relevance is Stigler's contention that institutional change, in particular the development of the modern corporation and the modern capital market, formed the prerequisite for the merger movement at the end of the nineteenth century.(9) Organised securities markets had been greatly expanded in the United States in the last decades of the nineteenth century. This can be seen in part as a result of the growth of the United States' economy in general and more particularly as an offshoot of the reorganisation of moribund railroads in the 1880s.(10) Whatever the proximate causes, the expanded securities market removed one major obstacle to the amalgamation of firms, namely the requirement of a large amount of capital.(11) Further, until the last quarter of the nineteenth century, unlimited liability had been a major obstacle to merger activity in the United States.(12) However,

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(8) "The salmon of the Columbia River, although sold at a higher price than ours, are handled at much lower rates...it will exclude our dealers from their markets and they will have to abandon the trade as they cannot compete...by paying such high freight and express rates." Canada, S.P., 1889, No. 8, p. 237. In the 1880s at least 79 percent and up to 98 percent of the total pack went to the United Kingdom. Up to 12 percent went to the United States in the same period. Eastern Canada accounted for much less than 10 percent of the market. See Appendix VII.

(9) G. J. Stigler, "Monopoly and Oligopoly by Merger", American Economic Review, vol. 40, 1950, pp. 23-34.

(10) T. R. Navin and M. V. Sears, "The Rise of a Market for Industrial Securities", Business History Review, vol. 29, 1955.

(11) G. J. Stigler, op. cit., p. 28.

(12) The powers of earlier corporations had been extremely limited. "They could not hold stock in other corporations; limits were placed on their capitalisation; often they could not do business outside of the state of their incorporation; exchange of capital assets for stock required the unanimous consent of the stockholders...." Ibid., p. 28.

in the next few years state laws underwent considerable modification as the various states began to vie with one another to attract corporations. By 1900 almost all legal restrictions on mergers had been removed. Leading the way in promoting this inter-state competition was New Jersey, the corporate home of BC Packers.(13)

Similar accommodating factors are apparent in the United Kingdom, the home of ABC Packers. The greatest growth in the securities market had occurred much earlier than in the United States.(14) Therefore, while not an immediate cause of the later merger activity, industrial consolidations certainly benefited from the creation of this precondition. Of more immediate importance were the qualitative changes in the use of limited liability from high to low share par values, from partly to fully paid-up shareholders and from few to many investors.(15) These were largely developments of the 1880s and only from this time on could the full potentialities of limited liability be fully realised.

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(13) E. Q. Keasby, "New Jersey and the Great Corporations", Harvard Law Review, 1899-1900, pp. 198-212 and pp. 264-278.

(14) This paragraph draws heavily on Ralph L. Nelson, op. cit., Appendix A, pp. 129-138.

(15) J. B. Jeffreys, "The Denomination and Character of Shares, 1855-1885", Economic History Review, vol. XVI, 1946, pp. 45-55.

3. The Motives for Merger: Theoretical Considerations

To this point the argument has been put forward that merger activity in the Fraser River salmon canning industry was not related to changes in transportation technology. Moreover, changes in corporation law and the expansion of the capital market occurred earlier than the merger activity and appear accommodating rather than causal factors in the emergence of new corporations. So why, then, did mergers take place? The simplest economic reasoning would suggest that firms merged in order to maximise their expected profits.(16) If we assume that this was the case, then three possibilities present themselves.

(i) Revenues could be raised through monopolistic manipulation of output levels and the market price of the finished product. With respect to the Fraser River salmon canning industry in the period under consideration, there is scant evidence pointing to the expectation that a merger of local companies would have any effect on the world market price of Fraser River canned salmon. Price was generally regarded, it seems, as an exogenous variable.(17)

(ii) Larger scale operations might lead to a reduction in average costs of production. The proposal presented to the canners

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(16) It has been suggested that many mergers were promoted on the basis of making a quick profit for the promoter without regard to the long term economic soundness of the business which was being created. However, to the extent that the promoters received payment for their services in stock of the new company and a management position within the new corporation, then their pay-off would depend on maximising the profitability of the new operation. This latter case seems to fit the BC Packers' merger and this allows us to make the assumption that cannery companies were merged in order to maximise expected profits.

(17) Canada, S.P., 1902, No. 54, p. 149. Over 80 percent of Fraser River output was sold in European markets where it was generally conceded that the Alaska pack rather than any other set the market price. Also, Canada, S.P., 1893, No. 10c, p. 331. Evidence of H. O. Bell-Irving to the British Columbia Fishery Commission. "...and it is really the Alaska pack that governs the English market. It has more effect than the Fraser River a good deal." The idea of regulating world market prices appears only once in the surviving documents. Henry Doyle, Report on British Columbia Salmon Industry. Unpublished. Dated December 5th, 1901. Special Collections Division, University of British Columbia.

of British Columbia in 1902 announced the intention to close down a number of plants, to enlarge the packing capacity of the remainder and to effect "large economies in the cost of supplies, handling of pack, and the disposing of it in the world's markets."(18)

(iii) Costs could have been lowered through restriction of competition in the markets for inputs. Between 1888-1891 and 1898-1901 the cost of raw fish per case of canned salmon had risen by 168 percent. This is shown in Table 1. In the same period the price of canned salmon on world markets fell by over 25 percent.(19) The resulting profit squeeze was a sore point among canners. Meanwhile, a large increase in the number of canneries operating on the Fraser River throughout the 1890s had undermined the strong market position of ABC Packers in the purchase of raw fish and to a lesser extent in the hiring of cannery labour. Attempts by informal organisations of

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(18) See Appendix II. Also, "by closing down a certain proportion (of canneries) and removing their machinery to the plants to be operated... the savings in operation will be extremely large and constitute an enormous profit in themselves...As some of our greatest economies are to be effected by the proper purchase of supplies and the sale of fish we propose having special departments covering these lines...The great secret of...success...lies in its management...A further department will be that of insurance...As the amount paid for insurance...is in excess of $50,000 it can easily be perceived what a large item of expense can be eliminated here." Henry Doyle, 1901, op. cit.

(19) The fall in world market prices during the 1890s reflects partly the emergence of new low-cost salmon producing areas. See Appendix VII. United States' effort shifted away from the Columbia River and was now concentrated in Alaska and Puget Sound. Fish traps were widely used in both areas while still very much restricted on the Fraser River. Moreover, growth of Puget Sound production was at the expense of Fraser River production. Total Fraser River fish production reached its peak between 1899 (off-year #1) and 1902 (sub-dominant year). However, the Fraser River pack as compared to the Puget Sound pack of Fraser River fish peaked as early as 1894 (sub-dominant year) and 1896 (off-year #2). See Appendix VIII, Tables 1, 3. Whereas, in 1890, 97 percent of Fraser River fish was canned in Fraser River canneries, this had fallen to below 40 percent between 1898 and 1900. See Appendix VIII, Table 6. The Fraser River's share of world output declined after the cycle, 1894 to 1897. See Appendix VIII, Table 4. Puget Sound's share of world production increased until 1913 with respect to the dominant cycle year and only declined significantly with what seems to have been overfishing of the second poor year's run after the peak of 1900.

TABLE 1

THE WORLD MARKET PRICE FOR CANNED SALMON
AND THE PRICE PAID FOR RAW FISH TO FRASER RIVER FISHERMEN
1887 TO 1901

Year	Price per Case of Canned Salmon $	Cost of Raw Fish per Case $	
		Fraser River	Puget Sound
1887	5.42	0.55	
1888	5.31	0.85	
1889	5.36	0.48	
1890	5.54	0.68	
1891	5.26	0.61	
1892	4.87		
1893	5.08		
1894	4.77		
1895	4.70		
1896	5.42	2.07	1.05
1897	4.90	0.95	0.84
1898	3.95	1.56	0.76
1899	4.45	2.39	1.95
1900	3.74	1.98	3.11
1901	3.92	1.10	-

Sources: Price per case of canned salmon. See Appendix VII. Price of raw fish per case of canned salmon. Fraser River. 1887-1891: these are the costs of raw fish per case to the Richmond Cannery of J. H. Todd and Company. Computed from data given to the British Columbia Fishery Commission, by J. H. Todd. Canada, S.P., 1893, No. 10c, p. 297. Todd was said to run a very efficient operation. 1896-1897: these are the costs of raw fish per case for ABC Packers. Canada, S.P., 1902, No. 54, Royal Commission on Chinese and Japanese Immigration, p. 147. Evidence of H. O. Bell-Irving. 1898-1901: by this time most fishermen were paid on the basis of contracted prices. The cost of raw fish is calculated by multiplying average season contract prices by the number of fish per case (approx. 10.4). Contract prices of fish reported in Ralston, Thesis (1965), op. cit., pp. 65-70. 1892-1895: during these years there was an undeterminable mixture of contract piece-rate and wage payment. No effort was made to calculate fish costs. Puget Sound. 1896-1900. Calculated from Canada, S.P., 1902, No. 10c, p. 148. Evidence of H. O. Bell-Irving.

cannery proprietors to retrench by reducing the price of fish were unsuccessful in the late 1890s. Moreover, by the 1890s, fishermen had begun to organise themselves into unions and the seasons 1893, 1897, 1900 and 1901 were prefaced by strikes.(20) Personal correspondence, one example of which is presented as Appendix III, emphasises much more the cost reduction to be expected through the presentation of a united front to the fishermen through a formally structured amalgamation of firms as well as the expected profits to be realised from the elimination of competition among buyers of raw fish, the reduction in the number of fishermen and a general regulation of the fishery.

The objective of this section is to determine theoretic criteria for assessing the relative importance of restriction of competition and internal economies of scale as motivations behind the merger movement of Fraser River canning companies.

At this point it is necessary to explain the methodology behind the following argument. Initially a model is constructed which purports to represent the possibility of a profitable merger based solely on monopsony power. The model leads directly to the delineation of a number of propositions which can be used to test the assertion that

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(20) In response to the question, which came first, unions or employers' organisations, the position is as follows. Formal mergers of canning company interests are noted as early as 1885 (Victoria Canning Company), 1889 (Ewen-Bon Accord-Haigh) and 1891 (ABC Packers). This is detailed in Appendix I. In 1892, the Fraser River Canners Association was formed "for mutual protection and for dealing with the Government". Percy Gladstone, Thesis (1959), op. cit., p. 100. The earliest organisation of fishermen appears to have been the Fraser River Fishermen's Protective and Benevolent Association of 1893. It organised an abortive strike in 1893, was defeated by united canners' action and was dissolved the same year. H. Keith Ralston, Thesis (1965), op. cit., pp. 49-68. A strike of white fishermen on the Fraser River in 1897 was unorganised. Ethnic rivalries seem to have been a major factor in lack of cohesion and lack of success of early fishermen's organisations. There is an early example of a fisherman-owned, co-operative canning company, The Fisherman's Canning Company, opened in 1894. Management problems are said to have plagued this operation and the cannery was sold by bankruptcy sale in 1899. Co-operative experiments in the salmon processing sector were not repeated until the 1920s and 1930s.

monopsony power was the dominant merger motivation. These tests are applied to the merger which created BC Packers in 1902 in Section 4, below, and then reformulated to check on the relative importance of internal economies of large scale production.

In exploring the possibilities of a profitable merger based on monopsony power make the following 'unpromising' set of assumptions:(21)

(i) all firms have identical long run costs regardless of the size of the operation

(ii) there is free entry of firms into the industry

(iii) the demand curve facing the industry is stable

(iv) the fixed capital involved in the industry is indestructible.

Even given such unfavourable conditions, mergers based on expectation of monopsony profit might be successful. Assumption (i) rules out internal economies of large scale production. The remaining assumptions will be dropped later.

Figure 1 represents the market situation facing the Fraser River canning industry. The market price, OB, is exogenously determined and is invariant to industrial structure. Changes in the size or number of individual firms in the Fraser River producing area have an insignificant effect on the world market price of canned salmon. The long run average and marginal cost curves, LAC and LMC, reflect external economies and diseconomies depending on whether industry output is below or above OF. At an output of less than OF the entry of new firms serves to reduce the costs of all firms. Beyond OF, new firms serve to increase the costs of all firms. Under perfect competition new firms will enter the industry expanding output to OC where only a competitive return to investment is to be obtained. In the early 1890s, it is clear that the industry on the Fraser River was operating on the rising portion of the LAC curve. Total pack, fishing effort and fish costs were all rising.

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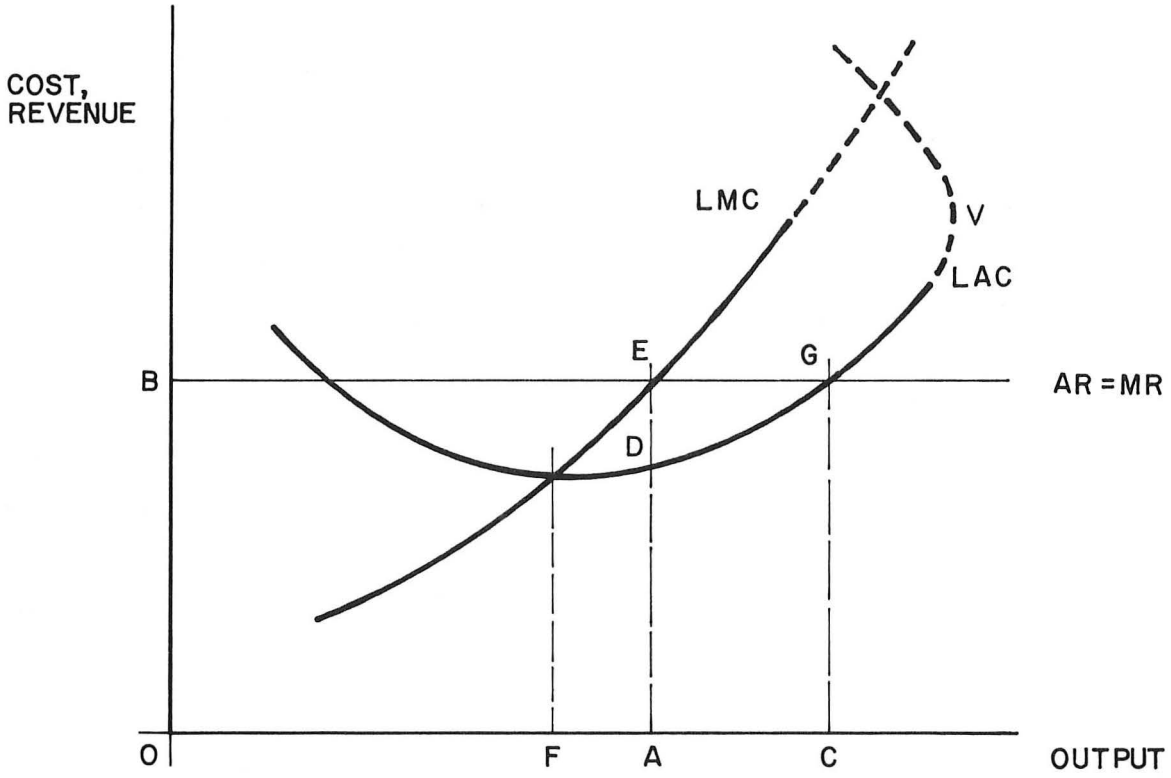
(21) Following G. J. Stigler, op. cit., p. 30.

FIGURE I

MONOPSONY IN AN INDUSTRY WITH EXOGENOUSLY DETERMINED DEMAND.



Now assume that all the firms involved in the industry merge to form a monopsony. Each operation produces a pro-rata share of a reduced total output, OA, and receives a pro-rata share of total profits, OA multiplied by DE. Industry profits are maximised and this has been achieved by restricting the competition for and thus the cost of inputs. Monopsonistic exploitation exists to the extent that inputs no longer receive payment equal to their contribution to total revenue.(22)

The existence of monopsony profits would encourage the entry of rival operations. These new firms would create external diseconomies competing input prices upwards and the industry would move out along the long run average cost curve to G where profits are once again eliminated. The originally merged companies may have moved by this time to a position of permanent loss in the sense that their investment now receives less than the competitive rate of return. This is especially true under the assumptions already made, namely easy entry (assumption ii), market stability (assumption iii) and inability to withdraw fixed capital (assumption iv). Under such circumstances the output of the merged companies may fall absolutely as well as relatively. Moreover, if this is the predicted course of events it will be more profitable to remain outside the merger rather than join in. For the restriction of each firm's output implied by merger is not duplicated by firms outside the merger. The latter can produce greater outputs while having the advantages of comparable input and selling prices.

It is evident, however, that even under these most stringent assumptions a merger to establish monopsony power may be profitable. This would be true if the sum of short run monopsony profits and longer term monopsony losses appropriately discounted turns out to be positive. Moreover, if we weaken our initial assumptions and allow a rising market price, a lagged rate of entry of new firms and the ability to redeploy fixed capital elsewhere, then monopsony profits might accrue over

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(22) C. E. Ferguson, Microeconomic Theory, Irwin-Dorsey, Homewood, Illinois, 1969, p. 410.

a relatively long period of time.(23)

By the late 1890s the possibilities of increasing profits through gaining control of input markets had perhaps widened. For at least two of the cycle years, the sub-dominant and the second poor year, the pack declined after the 1893-96 cycle. The first poor year pack peaked in 1899 and the dominant run provided its maximum pack in 1901. Table 1 of Appendix VIII details these findings. However, fish costs and the level of effort continued to climb. Interpretation of this situation requires recognition of the phenomenon of the backward bending, long run supply curve of fish. Increased effort in the late 1890s served both to raise costs and also eventually to reduce fish stocks. Output therefore declined as average costs continued to rise and the Fraser River salmon canning industry was moving along the backward-bending portion of its long run average cost curve, beyond V in Figure 1. A monopsonist who could control the level of effort in the fishery could realise an economic rent. This would be in addition to the possibility of exercising the same market power to pay factors at a rate less than their contribution to total revenue. The reduction of fishing effort would unequivocally serve to increase fish stocks. Whether pack levels in the long run would be higher or lower is indeterminate.(24)

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(23) One possibility is that the merged companies might operate to keep rivals out by maintaining profits at a level which looks unattractive to potential rivals to whom entry may be free but not costless. In the model outlined in the text this would have to be done by paying more than necessary for factor inputs. There is some evidence of this in the history of the Fraser River salmon canning industry. Ewen and Company were regarded as being very altruistic in the 1880s, paying higher than average prices for fish and labour. However, perhaps the rationale was to discourage entry into an industry in which their interests at that point in time held a dominant interest. Again many canning companies made no profits at all while associated interests did very well. ABC Packers was never a very profitable canning operation. However, the insurance and brokerage business of H. O. Bell-Irving seemed to do fairly well. H. O. Bell-Irving was the local manager of the packing operation also.

(24) For a more detailed analysis see P. Copes, "The Backward-Bending Supply Curve of the Fishing Industry", Scottish Journal of Political Economy, vol. 17, February, 1970, pp. 69-77. P. Copes, "Factor Rents, Sole Ownership and the Optimal Level of Fisheries Exploitation", Manchester School, June, 1972. R. Turvey, "Optimisation and Sub-Optimisation in Fishery Regulation", American Economic Review, vol. 54, 1964, pp. 64-76.

From the above analysis it follows that a monopsony-motivated merger would be suggested if positive results were obtained from tests of the following propositions.

(i) there was an explicit emphasis on reduction of competition with a view to reducing resource costs.

(ii) there was an explicit effort to play down potential internal diseconomies of large scale production and instead to place emphasis on potential internal economies to be achieved.

(iii) there was an explicit attempt to limit new entrants.

(iv) there was an explicit attempt to include all firms in the merger in order to ensure maximum input market control.

(v) there was an explicit attempt by established firms to encourage the formation of the merger accompanied by a reluctance to join in.

It can be noted that if internal economies of scale were the primary motive for merger then this would also be directly supported by a positive answer to (ii) above. Further, a positive response to propositions (i) and (iii) does not rule out the possibility of internal economies of large scale production. Only the emphasis would be different. A merger motivated by internal economies of large scale production would be promoted with emphasis on the appropriate cost reductions which the amalgamation would bring about. The protection of profits from potential external diseconomies caused by the entry of new firms would be a secondary consideration. The main motivation is clearly established by the weight of evidence on propositions (iv) and (v). For a positive response in each of these cases would be directly at odds with our expectations of a merger motivated by internal economies of scale. With respect to question (iv), a merger motivated by internal economies of scale would seek to create a firm of optimum size rather than maximum size. There is little reason to expect that the problem would be solved by a technical coincidence of maximum size and optimum efficiency. Lastly, concerning question (v), the existence of internal economies of scale would clearly encourage firm participation in amalgamation. For in this case the least profitable situation is to be a small firm outside the merger.

We now turn to the formation of BC Packers in 1902 to test the hypothesis that this particular merger was based on expected monopsony profits.

4. The Formation of the British Columbia Packers' Association of New Jersey, 1902

Returning to the mechanics of forming a merger in order to achieve a monopsony position, we can note that by the end of the nineteenth century the promotion of mergers had become a specialised and profitable business. The role of the promoter was twofold.(25)

(i) To make all financing arrangements for the merger including raising funds through an underwriting syndicate to cover the purchase of both fixed and working capital, and undertaking the promotion of the sale of the new corporation's securities to the public.

(ii) To secure the requisite options on the purchase of canneries. Here the approach was to emphasise the dismal outlook for an industry which remained characterised by atomistic units. In this way options could be obtained at a reasonable price. On the other hand a bright outlook was painted for the new corporation based on the expected cost savings to be made. This picture would encourage owners of canneries to dispose of their holdings in return for stock in the new company.(26) Also, of course, such a bright picture would encourage the plan's backers to proceed thus assuring the promoter his pay-off.

In the promotion of BC Packers these two functions fell to Aemilius Jarvis and Henry Doyle respectively. The personal correspondence of the latter has survived and is the primary evidence presented here. The official proposal presented to the salmon canners of British Columbia is reproduced as Appendix II. Appendix III presents a letter written by Henry Doyle to A. G. Kittson & Co., Glasgow, Scotland, dated 11th February, 1902. Appendix IV contains a letter written by Doyle to one

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(25) This paragraph draws heavily on Harry H. Lynch, Financial Performance of Conglomerates, Harvard University Press, Boston, 1971, pp. 22-23. See also G. J. Stigler, op. cit.

(26) In the case of BC Packers, Doyle had to provide a certain amount of cash as well as stock to cover the indebtedness of many of the local canning proprietors.

D. J. Munn in Montreal. Munn, in partnership with Alexander Ewen was one of the major interested parties in the Fraser River salmon canning industry and a supporter of the plan to create BC Packers. The letter is dated February 26th and reports on the progress of securing options. Reference is made in particular to the possibilities of securing options on the canneries belonging to J. H. Todd & Company. Lastly, Appendix V presents a letter to Doyle from J. H. Todd dated May 19th stating that company's refusal to join in the proposed amalgamation and withdrawing the options previously given to Doyle.

Henry Doyle for a long time had done business in Vancouver as managing director of the Doyle Fishing Supply Company of San Francisco. His business gave him a familiarity with the canning industry in British Columbia, yet at the same time he was enough of an outsider to be able to gain the trust of the mutually suspicious local canners. This was absolutely necessary to effect a successful take-over.(27) Furthermore, Henry Doyle had developed very good family connections. His wife's father was Marshall M. English, manager of several Fraser River canneries belonging to the rival ABC Packers and a pioneer salmon canner on the river. Jarvis, on the other hand, had equally good connections in the financial circles of eastern Canada. He had founded his own firm, Aemilius Jarvis & Company, Investment Bankers, in 1892. By all accounts Jarvis was a respected figure at the turn of the century. His career received a temporary setback in 1924 when he was imprisoned as a result of his involvement in a stock conspiracy scandal. On being released from prison Jarvis quickly reestablished himself and became Chairman of the Board of BC Packers before he retired in 1933.(28)

We now turn to a test of the propositions outlined in the previous section. Appendix II contains the official "prospectus of the position" sent to all canners in the province of British Columbia. Ap-

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(27) Henry H. Doyle, The Rise and Decline of the Pacific Salmon Fisheries, Unpublished Manuscript, University of British Columbia, Special Collections Division.

(28) Many of these personal details are related in Cicely Lyons, op. cit., pp. 332, 362 and 406.

pendix III contains a personal letter concerning the same to A. G. Kittson and Co. Both were written by Henry Doyle yet the variation in emphasis with respect to motivation is interesting. In fact, the intentions of the principals in the BC Packers' merger are rather ambiguous. The official publication places the burden of its emphasis on the internal economies of scale to be achieved in the purchasing of raw materials and the disposal of the pack. Such economies are stated as potentially reducing pack expenditure by as much as 25 percent. Yet there are grounds for considering the official prospectus as a poor indication of true motivation. For it is unlikely that the future general manager of BC Packers would want to boast, at least not to the local business community, that he was intending to restrict competition and to exert a monopsonistic control over resource prices. In fact, it would be prudent to keep as quiet as possible about this. Especially since the Canadian government had been known to legislate against supposed canners' monopolies in the past.(29) For this reason the personal letter to Kittson & Co. in far-off Scotland may be a more objective statement of motivation. In the latter document economies of large scale production are almost reduced to an addendum. The emphasis throughout is on the reduction and elimination of competition. The industry's problem is stated to be "competition...bidding up the price of raw fish". The solutions as stated are to do "away with excessive competition" and form a strong canners' association to "present a more united front".

Thus there are some initial intuitive grounds for supposing that the BC Packers' merger was motivated more by expected monopsony profits than by cost savings achieved from internal economies of scale. Yet the enumeration of the latter was an important piece of window dressing partly allaying fears that such a large organisation might run into internal diseconomies of scale and, more significantly, forming the basis of a politically safe argument through which the proposal could be 'sold' to the British Columbia business community. Even then, certain

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(29) Canada, S.P., 1893, No. 10c. Report of the British Columbia Fishery Commission, and subsequent changes in licencing regulations.

doubts were raised. J. H. Todd and Company, for example, in the correspondence reproduced as Appendix V, stated that they already made many of the cost savings envisaged by the new corporation. And Todd's cannery operations, while ably managed and well financed, were on a comparatively small scale.(30) This would not be out of line with a large part of the economics literature which concludes that while internal economies of scale may exist for very small firms the potential for firms of medium and large size is questionable.(31) The BC Packers' merger involved three of the largest interests in the industry at the time, the interests of Victoria Canning Company Ltd., and those of Alexander Ewen and George Wilson. Moreover, it sought to include all the largest companies.(32) On both counts the internal economies of scale argument is weakened. Lastly, we already noted that merger activity was observed at this time not only in the Fraser River salmon canning industry but in a very wide variety of industries in North America and Europe. "It is hard to believe that such a variety of technological developments as would be needed to bring production economies of scale to these diverse industries could have converged in the same short period of time."(33)

Restriction of entry was almost a sine qua non of monopsony-motivated merger. Otherwise the profitability of the new company would be threatened as new entrants competed input prices upwards again. The concern over the possibility of new rivals was shown in the commitments sought from former cannery proprietors, that having sold out to BC Packers, they would not engage in canning activities in the province of British Columbia for a period of seven years.(34)

This leaves for discussion the final and crucial propositions,

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(30) The output of J. H. Todd and Company in 1901 was 35,927 cases of canned salmon. For the Fraser River as a whole, 35 companies produced 974,911 cases for an average pack of 27,855 cases. The largest company produced over 100,000 cases and the smallest just over 11,000 cases.

(31) Henry H. Lynch, op. cit., pp. 27-28.

(32) See Kittson Letter, Appendix III, second from last paragraph.

(33) Ralph L. Nelson, op. cit., p. 103.

(34) Cicely Lyons, op. cit., p. 252.

(iv) and (v). In each case positive responses would lead to acceptance of monopsony as the dominant motivation for merger and relegate internal economies of scale to an inferior position. Proposition (iv) seeks evidence on whether:

(iv) there was an explicit attempt to include all firms in the merger.

Alternatively, if there was an explicit attempt to achieve an enlarged company of optimum size this would lend weight to the internal economies of scale hypothesis. And as noted before, there is no reason to expect a technical coincidence of maximum company size and optimum economic efficiency.(35) All the evidence points to the desire to attain as high a percentage as possible of the salmon canneries in the province. The Kittson letter is quite explicit in the intent "to amalgamate all or as many as possible of the canning plants of British Columbia". Further, the financial backers were not prepared to go ahead unless a critical 60 percent was to be under their control.(36) There is nowhere the suggestion that optimum scale was an objective. Everything points rather to the desired attainment of maximum market power and maximum ability to regulate the fishery.

Lastly, there is the fifth proposition relating to a monopsony-motivated merger:

(v) there was an explicit attempt by established firms to encourage the formation of the merger accompanied by a reluctance to join in.

As already explained the existence of this phenomenon would be untenable were internal economies truly to be achieved by merger. For in this case the least profitable course would be to remain a small operator and thus firms would be positively encouraged to join in the consolidation. The evidence in the final outcome fully supports the hypothesis of monopsony-motivated merger. In the Kittson letter Doyle writes that the

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(35) The economies of scale to be achieved by enlarged canneries did not necessarily require an enlarged company. In fact, there seems to be little correlation between company and cannery sizes.

(36) See Munn Letter, Appendix IV, last paragraph.

"Anglo-British Columbia Packing Co. Ltd., United Canneries Ltd. and the Victoria Canning Co. are all heartily in favour". Yet in the end, only the Victoria Canning Company Ltd. joined in. Todd & Company's behaviour was particularly difficult to assess. Todd gave Doyle an option on purchasing his canneries knowing that "the fact of his having done so will assist greatly in getting others in". (Doyle to D. J. Munn.) Yet in the end Todd withdrew his options and Doyle was to remain very bitter about such "violated promises".(37) Whether this was a case of a change of heart as Todd became better acquainted with the conditions of the merger or a deliberate ploy to have the merger go ahead without Todd & Co. being a part of it, is difficult to say.

In summary, this section has attempted to answer the question: Was the BC Packers' merger motivated by the prospects of monopsony power or by the prospects of internal economies of scale? The answer given here is that restriction of competition was the major reason for companies to merge while prospects of economies of scale were a secondary, though perhaps not an unimportant motivation. The argument runs as follows.

(i) Concentration of producers was intended to create a company of maximum size. There is little reason to expect a technical coincidence of maximum size and optimum efficiency.

(ii) Steps were taken to restrict entry.

(iii) There is evidence that established firms encouraged the formation of the merger but were reluctant to join in.

This is the pattern of behaviour predicted by the theoretical model of monopsony-motivated merger constructed in the previous section. At first sight this behaviour would seem to be contradictory given the publicly stated aim to achieve a more efficient scale of operations. The explanation probably has two dimensions. First of all it would not have been wise from the point of view of local public relations to emphasise the expected profits accruing from successful exploitation of local inputs and regulation of the fishery through restriction of competition.

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(37) Henry H. Doyle, op. cit., p. 230.

The emphasis on economies of scale on the other hand provided a much safer rationale for the merger. Secondly, to the extent that monopsony profits might be offset by higher costs associated with running an unwieldy, giant corporation, such fears could be allayed by a counter emphasis on the significant internal economies of scale expected to be achieved.

5. Empirical Study of Changes in Firm Size

The paper, thus far, has attempted to identify the motives which led to the consolidation of Fraser River salmon canning companies to form BC Packers in 1902. The weight of the evidence has led to the tentative conclusion that BC Packers and presumably ABC Packers too, expected to achieve monopsony power and related profits. As a further test, we now turn to the actual growth experience of companies engaged in the Fraser River salmon canning industry between the years 1887 and 1909. Looking at actual size changes among firms may lead to a greater insight as to the relative importance of internal economies of large scale production and monopsony position. Size change is analysed in Appendix VI using a simple model. At the same time it was possible to calculate coefficients of industrial concentration for twenty time periods between 1887 and 1909. What follows is a brief report on the major conclusions of this statistical study.

Appendix VI, Table 3, shows the estimated transition matrix for the Fraser River salmon canning industry between the years 1887 and 1909. Note that:

(i) The probability of further firm growth diminished as firms reached a medium size, 16,000 to 32,000 cases of canned salmon per year.

(ii) Medium-sized firms tended to be the most stable, that is there was least probability that they would either grow or decline.

(iii) There was a tendency for firms of larger size to decline.

This confirms a suspicion that there were few economies of scale to be achieved from firm growth beyond a medium size. Moreover, the facts suggest that firms in the industry attempted to achieve an optimum size that was a medium size. J. H. Todd was one such medium-sized company and we have already noted their statement that they already made many of the savings proposed for BC Packers at their existing scale of operations. Lastly, recall that a corollary of the model was the tendency for a monopsonist to reduce his demand for inputs through reduction of output.

The noted decline in size over time of larger firms may thus be seen in two ways: as a further indication of monopsony-motivated merger and as an attempt to move closer to an optimal scale of operations.

Appendix VI, Table 9, presents a series of coefficients of concentration. In eighteen out of twenty time periods the level of industrial concentration in the Fraser River salmon canning industry was above current economy wide estimates. The figures suggest the following scenario. The entry of ABC Packers in 1891 gave it a strong but short-lived monopsonistic position. Rapid entry and growth of many small companies, coupled with a falling world market price of canned salmon, led to both an absolute and relative decline in ABC Packers' operations. Meanwhile, smaller companies like J. H. Todd, which had remained outside the merger may have fared a bit better. By 1901, ABC Packers' monopsony power including their power to regulate the fishery had been totally dissipated and the company had moved to a position of permanent 'loss' as previously defined.(38) BC Packers emerged in 1902 and operated successfully throughout the period of this study. Levels of concentration were maintained and the coincidence of a rising world market and successful limitation of new entrants into both the fishing and processing sectors seem to have been the major conditions favouring continued monopsony profits.

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(38) Canada, S.P., 1902, No. 54, evidence of Henry O. Bell-Irving to the Royal Commission on Chinese and Japanese Immigration. ABC made losses on the Fraser 1899 to 1901 inclusive. p. 148.

6. Conclusions and Implications

The conclusions of this study can be stated very briefly. The years 1891 and 1902 represent the crests of two waves of merger activity involving a drastic restructuring of the Fraser River salmon canning industry. These two peak years gave birth to ABC Packers and BC Packers respectively. The merger activity was not unique to British Columbia but rather a microcosm of changes in industrial structures occurring throughout the industrialised world. Tying in with this international aspect of the merger activity, we see the control and overall capitalisation of the local Fraser River industry passing in large part out of local and indeed out of Canadian hands.

The major objective at that time seems to have been to gain control of input markets. By regulating the fishery, the large corporations could reap economic rents. And by acting as monopsonists in input markets, monopsony profits could be gained through payment of factors at rates lower than their contribution to total revenues.

ABC Packers represents the less successful of the two mergers. It seems to have been unable to restrict the entry of rival canning operations and the entry of new fishermen which these entailed. Moreover, world market prices of canned salmon suffered heavy declines after 1891. Finally, the erosion of ABC Packers' dominance on the Fraser was accompanied by a growth of fishermen's unions. In the end ABC Packers showed losses on its Fraser River operations from 1899 to 1901 inclusive.

BC Packers, on the other hand, was much more successful. It managed to maintain its dominant position on the river, was instrumental in reducing the number of fishermen and faced a rising world market price of canned salmon. Company profits rose steadily throughout the early 1900s and ran between $300,000 and $475,000 per year between 1908 and 1916.

The implications of this study are far reaching. The reduction of factor shares is a sine qua non of monopsony-motivated merger. This type of exploitation of local factors and the draining off of resulting profits is the kind of behaviour which supposedly characterises imperialism. Thus, if this case study is a typical one and if the influx of foreign capital into British Columbia at the end of the last century was widely tied to monopsonistic exploitation, then there are some conclusions to be drawn about the role of foreign capital in British Columbia's economic development. Also, some factors could be more readily exploited than others. In particular, to what extent did the burden fall on the various groups which participated in the Fraser River salmon canning industry; the established Victoria merchant class, the Chinese contract cannery workers, the native Indian fishermen, the Japanese immigrant fishermen, and the white fishermen who by the year 1900 were in the process of forming themselves into a strong union?

There are also implications for the management of the resource, the Pacific salmon. In this case it is possible that the success of BC Packers could work towards the attainment of a more socially desirable level of resource conservation. Resource economists have for long lamented the open access aspects of fisheries and the resulting over capitalisation which this involves. There is no doubt that the fragmented industrial structure of the 1890s was grossly inefficient and that economic returns were far below potential. The emergence of BC Packers as the major buyer of raw fish on the river and the subsequent rationalisation of the fishery, would lead to a more optimal allocation of resources resulting in the fishery yielding net economic rent. However, with this solution to the resource allocation problem comes a distribution of income problem. To the extent that rent accrued to BC Packers as profits, it would be largely siphoned out of British Columbia and perhaps even out of Canada. In practical terms, however, the company's monopsony power was restricted by two factors. After 1889, the canning industry had first of all to live with renewed government attempts to regulate the fishery. Such regulation could neither guarantee the canners a con-

tinued supply of fishing licences nor the continued restriction of the number of fishermen. The opening of the river to all bona fide fishermen in 1892 and the progressive restriction of cannery-owned licences during the 1890s further loosened the control of the canner over raw fish costs. Secondly, the emergence of fishermen's unions in the early 1890s and their strengthening in the early years of the twentieth century would tend to counter the market power of the canning companies. Fishermen's co-operatives have also added to fishermen's strength in more recent times. In short, the emergence of BC Packers might have advanced the interests of the large companies and also those groups in the labour force which were best able to organise themselves. The groups which gained least were those which were unable to organise. Under these conditions unorganised Indian labour and contracted Chinese cannery labour probably had their share of total income reduced. Indian fishermen, for example, the largest ethnic group in the period 1891-1894, had become the smallest group by 1901-1904. Their demise at this time may have been due to the particular combination of group characteristics, namely militancy and poor organisation.(39)

The emergence of a few large companies after 1890 spelled the curtailment of the economic power of the Victoria merchant-broker and also, in effect, the curtailment of the economic power of the city of Victoria itself. By the middle of the 1880s the Fraser River salmon canning industry had consisted of thirteen small firms, each of which was tied to one of six brokerage houses, all but one located in Victoria. The Victoria merchant acted not only as broker but also as money lender, input supplier, insurance and shipping agent. However, the new corporations tended to be bank financed and the rapid expansion of banking in British Columbia presented major alternative sources of financing. Furthermore, backed by well known eastern and British financiers, the new limited liability companies would have a very high credit rating and have access to the emerging security markets.

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(39) See Appendix IX. Also Percy Gladstone, Thesis (1959), op. cit., pp. 244-247.

As long as the canning industry was directly controlled by the Victoria merchant, the British Columbian economy was controlled by Victoria city. All imports and exports entering and leaving the province had to pass through Victoria and be trans-shipped to and from the outlying areas. This of course added considerably to freight charges. The demise of Victoria as the centre of the Fraser River salmon canning industry was sealed when ABC Packers set up its headquarters in Vancouver. It was not long before the channels of the Fraser were deepened to allow ocean going ships to pull up along side the cannery wharves. With the economic advantages of the Victoria merchants gone, Vancouver soon became the hub of economic activity in British Columbia.

APPENDIX I

(A) Exit and Entry of Companies into the Fraser River Salmon Canning Industry, 1870-1909.

(B) Directory of Companies Involved in the Fraser River Salmon Canning Industry, 1870-1909.

APPENDIX I.

(A) Exit and Entry of Companies into the Fraser River Salmon Canning Industry, 1870-1909.

Year	Total No. of Firms		New Firms		Firm Exit		Total No. of Canneries		New Canneries		Cannery Exit	
	No.	Firm Code	No.	Firm Code	No.	Firm Code	No.	Cannery Code	#	Cannery Code	#	Cannery Code
1870	2	1;2	2	1;2	0		2	1;2	2	1;2	0	
1871	2	1;2	0		0		2	1;2	0		0	
1872	2	1;3	1	3	1	2	2	1;2	0		0	
1873	4	1;3;4;5	2	4;5	0		4	1;2;4;5	2	4;5	0	
1874	4(?)	1;3;4(?);5	0		0		4	1;2;4(?);5	0		0	
1875	3	1;3;5	0		1	4	3	1;2;5	0		1	4
1876	3	3;5;6	1	6	1	1	4	1;2;5;6	1	6	0	
1877	5	3;5;6;7;8	2	7;8	0		6	1;2;5;6;7;8	2	7;8	0	
1878	8	3;4;5;6;8;9;10;11	4	4;9;10;11	1	7	8	1;2;4;5;6;8;10;11	3	4;10;11	1	7
1879	7	5;6;8;9;10;11;12	1	12	2	3;4	8	1;2;5;6;8;10;11;12	1	12	1	4
1880	7	5;6;8;10;11;12;13	1	13	1	9	8	1;5;6;8;10;11;12;13	1	13	1	2
1881	8	5;6;8;10;11;12;13;14	1	14	0		9	1;5;6;8;10;11;12;13;14	1	14	0	
1882	10	5;6;8;10;11;12;13;14;16;17	2	16;17	0		12	5;6;8;10;11;12;13;14;15;16;17;18	4	15-18	1	1
1883	12	5;6;8;10;11;12;14;16;17;19;20;21	3	19-21	1	13	13	5;6;10;11;12;13;14;16;17;18;20;21;22	3	20-22	2	8;15
1884	6	6;8;14;16;19;21	0		6	5;10;11;12;17;20	6	6;13;14;16;21;22	0		7	5;10;11;12;17;18;20
1885	5	6;10;16;17;23	3	10;17;23	4	8;14;19;21	6	6;10;11;13;16;17	3	10;11;17	3	14;21;22
1886	8	5;6;10;16;17;20;23;24	3	5;20;24	0		11	5;6;10;11;12;13;14;16;17;20;22	5	5;12;14;20;22	0	
1887	9	5;6;10;16;17;20;23;24;25	1	25	0		12	5;6;10;11;12;13;14;16;17;20;22;25	1	25	0	
1888	9	5;6;8;10;16;17;20;23;25	1	8	1	24	12	"	0		0	
1889	11	5;6;8;10;16;17;20;23;25;27;28	2	27;28	0		17	5;6;8;10;11;12;13;14;16;17;20;22;25;26;27;28;29	5	8;26-29	0	

Year	Total No. of Firms		New Firms		Firm Exit		Total No. of Canneries		New Canneries		Cannery Exit	
	No.	Firm Code	No.	Firm Code	No.	Firm Code	No.	Cannery Code	#	Cannery Code	#	Cannery Code
1890	12	5;6;8;10;16;17;20;23;25;27;28;30	1	30	0		17	5;6;10;11;12;13;14;16;17;20;22;25;26;27;28;29;30	1	30	1	8
1891	7	5;6;16;17;23;25;31	1	31	6	8;10;20;27;28;30	18	5;6;10;11;12;13;16;17;20;22;25;26;27;28;29;30;31;32	2	31;32	1	14
1892	7	5;6;16;17;23;25;37	1	37	1	31	14	5;6;10;11;13;16;20;22;25;26;28;29;32;37	1	37	5	12;17;27;30;31
1893	12	5;6;16;17;23;25;31;37;38;39;40;42	5	31;38;39;40;42	0		23	5;6;10;11;12;13;14;16;20;22;25;26;27;28;29;31;32;37;38;39;40;41;42	9	12;14;27;31;38;39;40;41;42	0	
1894	14	5;6;16;17;23;31;37;38;39;40;42;43;44;45	3	43;44;45	1	25	25	5;6;10;11;12;13;16;20;22;25;26;27;28;29;31;32;37;38;39;40;41;42;43;44;45	3	43;44;45	1	14
1895	18	as per 1894 + 46;47;48;49	4	46;47;48;49	0		28	5;6;10;11;12;13;16;20;22;25;26;27;28;29;31;37;38;39;40;41;42;43;44;45;46;47;48;49	4	46;47;48;49	1	32
1896	23	6;16;17;23;37;38;40;42;43;44;45;46;47;48;49;50;51;53;54;55;56;57;58	8	50;51;53;54;55;56;57;58	3	5;31;39	32	6;10;11;13;16;20;22;25;26;27;29;37;38;40;41;42;43;44;45;46;47;48;49;50;51;52;53;54;55;56;57;58	9	50;51;52;53;54;55;56;57;58	5	5;12;28;31;39
1897	28	5;6;16;17;23;37;38;42;43;44;47;48;49;50;51;53;54;55;56;57;58;60;61;62;63;64;65;67	8	60;61;62;63;64;65;5;67	3	40;45;46	39	5;6;10;11;12;13;16;20;22;25;26;27;29;37;38;41;42;43;44;48;49;50;51;52;53;54;55;56;57;58;59;60;61;62;63;64;65;66;67	11	5;12;59;60;61;62;63;64 65;66;67	4	40;45;46;47
1898	33	5;6;16;17;23;37;38;42;43;44;46;47;48;49;50;51;53;54;55;56;57;58;60;61;62;63;64;65;67;68;69;70;71	5	46;68;69;70;71	0		44	5;6;10;11;12;13;16;20;22;25;26;27;29;37;38;40;41;42;43;44;45;46;48;49;50;51;52;53;54;55;56;57;58;59;60;61;62;63;64;65;66;67;69;70	5	40;45;46;69;70	0	
1899	32	5;6;16;17;23;37;38;42;43;44;46;47;48;49;50;53;54;55;56;57;58;60;61;62;63;68;71;72;73;74;75;76	5	72;73;74;75;76	6	51;64;65;67;69;70	44	5;6;10;11;13;16;20;22;25;26;27;37;38;40;41;42;43;44;45;46;48;49;50;51;52;53;54;55;56;57;58;59;60;61;62;63;66;70;72;73;74;75;76;77	6	72;73;74;75;76;77	6	12;29;64;65;67;69

Year	Total No. of Firms		New Firms		Firm Exit		Total No. of Canneries		New Canneries		Cannery Exit	
	No.	Firm Code	No.	Firm Code	No.	Firm Code	No.	Cannery Code	#	Cannery Code	#	Cannery Code
1900	32	5;6;16;17;23;37;38;42;43;44;46;47;48;49;50;53;54;55;56;57;60;61;62;63;68;71;72;73;74;75;76;78	1	78	1	58	42	5;6;11;13;16;20;22;26;27;37;38;40;41;42;43;44;46;48;49;50;51;52;53;54;55;56;57;58;59;60;61;62;63;66;70;72;73;74;75;76;77;78	1	78	3	10;25;45
1901	34	5;6;16;17;23;37;38;42;43;44;46;47;48;49;50;53;54;55;56;57;60;61;62;68;71;72;73;74;75;76;78;79;80;82	3	79;80;82	1	63	46	5;6;10;11;13;16;20;22;25;26;27;37;38;40;41;42;43;44;45;46;48;49;50;51;52;53;54;55;56;57;58;59;60;61;62;63;66;70;72;73;74;75;76;77;78;82	4	10;25;45;82	0	
1902	11	5;16;17;43;49;74;78;79;81;82;23	1	81	25	6;37;38;42;44;46;47;48;50;52;53;54;55;56;57;60;61;62;68;71;72;73;75;76;80	40	5;6;10;11;16;20;22;26;27;37;38;40;41;42;43;44;46;48;49;50;51;52;54;55;56;57;58;60;61;62;63;66;70;73;74;75;76;77;78;82	6	13;25;45;53;59;72	0	
1903	11	As per 1902	0		0		34	5;6;10;16;20;22;26;27;37;38;40;41;43;44;46;49;50;51;52;54;57;58;60;61;62;63;66;70;73;74;76;77;78;82	0		6	11;42;48;55;56;75
1904	10	As per 1902 minus 81	0		1	81	23	5;6;16;22;26;27;37;38;40;41;43;49;50;58;60;61;66;73;74;76;77;78;82	0		11	10;20;44;46;51;52;54;57;62;63;70
1905	16	5;16;17;23;43;49;74;78;79;81;82;84;85;86;87;88	6	81;84;85;86;87;88	0		37	5;6;10;16;20;22;26;27;37;38;40;41;43;44;46;50;51;52;57;58;60;61;62;63;66;70;73;74;76;77;78;82;84;85;86;87;88	15	10;20;44;46;51;52;57;62;63;70;84;85;86;87;88	1	49
1906	18	5;16;17;23;43;49;74;78;79;82;85;86;87;89;90;91;92;93	5	89;90;91;92;93	3	81;84;24 88		5;6;16;22;27;37;40;43;50;52;58;60;66;74;77;78;82;85;86;87;90;91;92;93	4	90;91;92;93	17	10;20;26;38;41;44;46;51;57;61;62;63;70;73;76;84;88

Year	Total No. of Firms		New Firms		Firm Exit		Total No. of Canneries		New Canneries		Cannery Exit	
	No.	Firm Code	No.	Firm Code	No.	Firm Code	No.	Cannery Code	#	Cannery Code	#	Cannery Code
1907	13	5;16;17;23;43; 49;74;78;79;82; 85;86;90	0		5	87;89;18 91;92; 93	5;6;16;22;27;37; 40;50;52;58;66; 74;77;78;82;85; 86;90		0		6	60;87; 43;91; 92;93
1908	7	16;17;23;49;74; 79;89	1	89	7	5;43; 16 78;82; 85;86; 90	Details not available					
1909	14	5;16;17;23;43; 49;74;78;79;82; 85;89;94;95	7	5;43; 78;82; 85;94; 95	0		38	Details not available				
1910	Statistics not published for individual companies after this date.											

APPENDIX I.

(B) Directory of Companies Involved in the Fraser River Salmon Canning Industry, 1870-1909.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1870	1.	Alexander Loggie & Co.	Alexander Loggie; James Wise; David S. Hennessy; Alexander Ewen	1.	Annieville	Transferred to New Westminster in 1873 and thereafter bought out by 6, below, in 1876. Cannery closed 1882.
1870	2.	Stamp & Co.	Captain Edward Stamp	2.	Sapperton	Sold to 3 below in 1872.
1872	3.	Holbrook & Co.	Henry Holbrook; Cunningham	2.	"	Taken over by 9 in 1878 and destroyed by fire 18.9.79.
1873	4.	Lane, Pike & Nelson.		4.	New Westminster	Operation closed in failure in 1879.
1875	5.	B. C. Canning Co. Ltd.	Findlay; Durham; Brodie	5.	Deas Island	Company and cannery in operation through whole period.
1876	6.	Ewen & Co.	Alexander Ewen	6.	Lion Island	Also operated 1 until 1882.
1877	7.	Finlayson and Lane		4.	New Westminster	Disbanded after one season.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1878	8.	English & Co.	Marshall M. English	8.	Brownsville	Main operations transferred to cannery 22 in 1883. Finally closed 1890.
1878	9.	King & Co.	King; Wright	2.	Sapperton	Destroyed by fire 18.9.79.
1878	10.	British Columbia Packing Co.	Finlayson; Peter Birrell	10.	Annieville	Absorbed in 33 in 1891 and cannery renamed the B. C.
1878	11.	Delta Canning Co.	T. E. Ladner; J. Laidlaw; D. Chisholm; F. Page	11.	Delta	First cannery at river mouth. Absorbed in 23 in 1885.
1879	12.	Benjamin Haigh & Co.		12.	Haigh's	Taken over by 6 in 1886.
1880	13.	Adair & Co.		13.	Canoe Pass	Operation taken over by 19 in 1883.
1881	14.	James Laidlaw & Co.		14.	Sapperton	Absorbed in 23 in 1885.
1882	14.	James Laidlaw & Co.		15.	Laidlaw (2)	"
1882	16.	J. H. Todd & Sons Ltd.		16.	Richmond	Company still operating in 1909.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1882	17.	British American Packing Co.		17.	British American	Absorbed in 33 in 1891.
1882	13.	Adair & Co.		18.	British Union	Cannery closed 1883 at end of season.
1883	19.	Wellington Packing Co.	T. E. Ladner; A. Welch; Rithet; F. Page	13.	Canoe Pass	
1883	20.	E. A. Wadhams		20.	Wadhams	Absorbed in 33 in 1891.
1883	21.	Spratt's Ark (Floating Cannery)		21.	Spratt's Ark	Closed 1885.
1883	8.	English & Co.		22.	Phoenix	Absorbed in 33 in 1891.
1885	23.	Victoria Canning Company Ltd. (1891)	A. Welch; Rithet; J. Laidlaw; T. E. Ladner	11. 13. 14.	Delta Wellington Laidlaw's	Absorbed in 83 in 1902.
1886	6.	Ewen & Co. (Bon Accord Fishery Co.)	Alexander Ewen; D. J. Munn	12.	Bon Accord	Haigh's renamed.
1886	24.	Coleman & Co. (San Francisco)		8.	Assets of company 8 acquired by agents after court action.	
1887	25.	Harlock Packing Co.		25.	Harlock	Absorbed in 23 in 1894 season.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1889	16.	J. & H. Todd & Sons Ltd.		26.	Beaver	
1889	27.	Drysdale & Co.		27.	Canoe Pass	Absorbed in 33 in 1891.
1889	28.	Hobson & Co.		28.	Garry Point	"
1889	6.	Ewen & Co. (Bon Accord Fishery Co.)	Alexander Ewen; D. J. Munn	29.	Sea Island	
1890	30.	Duncan Batchelor and others.		30.	Britannia	"
1891	31.	Lulu Island Canning Co.		31.	Lulu Island	Operations ceased after 1895.
1891	23.	Victoria Canning Co. Ltd.		32.	Holly	Washed away after 1894 season. Dummy 1891-92.
1891	33.	Anglo-British Columbia Packing Co. Ltd.	Bell-Irving	10. 17. 27. 20. 22. 28. 30.	Birrell's B. C. British American Canoe Pass Wadhams Phoenix Garry Point Britannia	Eastern capital + British capital, London, U. K., H. O.
1891	33.	"		34. 35.	Annandale Dumfries	Dummy canneries built to obtain fishing licences. Never canned a fish.
1891	6.	Ewen & Co.		36.	Ewen #2	Dummy "

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1892	37.	Terra Nova Packing Co.	Rowan	37.	Terra Nova	Operations ceased in 1898. Cannery bought by 83 in 1902.
1893	38.	Pacific Coast Packing Co.	Geo. Wilson; Bain	38.	Pacific Coast	Absorbed in 83 in 1902.
1893	39.	Steveston Canning Co.		39.	Steveston	Operations ceased after 1895. Revived as 86 in 1905 (?).
1893	40.	Short & Squair		40.	Imperial	Operations ceased after 1896. Reopened by 68 in 1898.
1893	6.	Canadian Pacific Packing Co. Ltd.	Alexander Ewen	41.	Canadian Pacific	Absorbed in 83 in 1902.
1893	42.	Brunswick Canning Co.	Dawson; Buttimer; Geo. Wilson	42.	Brunswick #1	"
1894	23.	Victoria Canning Co. Ltd.		25.	Harlock	"
1894	43.	United Canning Company	Malcolm; Cannon	43.	Gulf of Georgia	Cannery sold to Lee Coy, 89 in 1906. Company operated 1909.
1894	44.	Good, Murphy & Dinsmore		44.	Dinsmore Island	Absorbed in 83 in 1902.
1894	45.	Fisherman's Canning Co. (Co-operative)		45.	Fisherman's	Sold by bankruptcy sale 1899. Operated by 71 in 1900. Bought and closed by 83, 1902.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1895	46.	Atlas Canning Co.	Houstoun	46.	Atlas	Absorbed in 83 in 1902.
1895	47.	Boutillier & Co.		47.	Boutilliers	" Company operated in cannery 59 after 1896.
1895	48.	Alliance Canning Co.	Colquhoun	48.	Alliance	Sold to Geo. Wilson sometime in 1901. Absorbed in 83 in 1902.
1895	49.	Canadian Canning Co. Ltd.	Costello	49.	Star	Company operating 1909.
1896	50.	Anglo-American Packing Co		50.	Anglo-American	Absorbed in 83 in 1902.
1896	51.	McPherson & Hickey		51.	Vancouver	Absorbed in 49 in 1899.
1896	49.	Canadian Canning Co. Ltd.		52.	Fraser River	
1896	53.	Westham Island Packing Co.	McDonald Bros.	53.	Westham Island	Absorbed in 83 in 1902.
1896	54.	Lam Tung		54.	Westminster	"
1896	55.	J. A. Hume		55.	Hume's	"
1896	56.	Provincial Canning Co.		56.	Provincial	"

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1896	57.	W. Morris		57.	Lighthouse (Federation)	Absorbed in 83 in 1902 and cannery sold to 81.
1896	58.	Fraser River Industrial Society		58.	Industrial	Cannery to 79 in 1901.
1897	47.	London Canning Co. (Boutillier?)		59.	London	Absorbed in 83 in 1902.
1897	60.	Currie & McWilliams		60.	Currie's	"
1897	61.	Welch Bros.		61.	Celtic	"
1897	62.	Cleave Canning Co.		62.	Cleave	"
1897	63.	Columbia Packing Co.		63.	Colonial	Taken over by 80 in 1901.
1897	64.	Brennan Bros.		64.	Ontario	Operations cease after 1898.
1897	65.	Sinclair Canning Co.		65.	Mayflour	"
1897	66.	Brunswick Canning Co.		66.	Brunswick #2	Absorbed in 83 in 1902.
1897	67.	Western Fisheries Co.		67.	W. F. C.	Operations cease after 1898.
1898	68.	Robert Ward & Co. Ltd.		40.	Imperial	Absorbed in 83 in 1902.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1898	69.	M. Robinson		69.	Labrador	Operations cease after 1898.
1898	70.	English Bay Canning Co.		70.	English Bay	Absorbed in 43 in 1899.
1898	71.	Turner, Beaton & Co.		45.	Fisherman's	Absorbed in 83 in 1902.
1899	72.	Bryn & Walker		72.	Premier	Operations cease after 1901.
1899	73.	Albion Island Canning Co.	Geo. Wilson and others	73.	Albion Island	Absorbed in 83 in 1902.
1899	74.	St. Mungo Canning Co. Ltd.		74.	St. Mungo	Operating 1909.
1899	75.	Greenwood Packing Co.		75.	Greenwood	Absorbed in 83 in 1902.
1899	76.	Acme Canning Co.		76.	Acme	"
1899	43.	United Canning Company		77.	Scottish Canadian	Operating in 1909.
1900	78.	Great Northern Canning Co. Ltd.		78.	Great Northern	"
1901	79.	Unique Canning Company Ltd.	C. S. Windsor	58.	Industrial	"
1901	80.	Kwong Mon Tai Company		63.	Colonial	Absorbed in 83 in 1902.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1901	82.	National Canning Company Limited		82.	Eagle Harbour	Operating in 1909.
1902	81.	Federation Brand Salmon Canneries Ltd.		57.	Lighthouse	Operations cease after 1903.
1902	83.	British Columbia Packers' Association of New Jersey	6. Ewen's 11. Delta 13. Wellington 12. Bon Accord 25. Harlock 37. Terra Nova 48. Alliance 50. Anglo-American 53. Westham Island 73. Albion 54. Westminster 59. London 61. Celtic 75. Greenwood	38. 41. 42,66. 44. 45. 46. 55. 56. 40. 76. 57. 60. 62.	Pacific Coast Canadian Pacific Brunswick #1, #2. Dinsmore Island Fisherman's Atlas Hume's Provincial Imperial Acme Lighthouse Currie's Cleave	
1905	84.	Buttimer & Dawson		84.	Harlock Island	Operated season only
1905	85.	Burrard Canning Co. Ltd.		85.	Brunswick	Destroyed by fire, 1910.
1905	86.	Steveston Canning Co.		86.	Steveston	Operations cease after 1907.
1905	87.	Peter Birrell		87.	Birrells	Operations cease after 1906.
1905	88.	Vancouver Fishing and Curing		88.		One season.

Year	Code #	Company Name	Principals	Code #	Cannery Name	Remarks
1906	89.	Lee Coy		43.	Gulf of Georgia	Operations cease after 1909(?).
1906	90.	Great Western Packing Co. Ltd.		90.	Great Western	Operations cease after 1907.
1906	91.	George Wilson		91.		One season.
1906	92.	Royal Packing Company		92.		"
1906	93.	Nye Canning Company		93.		"
1909	94.	Glen Rose Canning Co. Ltd.		94.		
1909	95.	M. DesBrisay & Co.		95.		

APPENDIX II.

A Proposal to the Salmon Canners of British Columbia to Merge to Form BC Packers.

Private and Confidential.

VANCOUVER, B.C., *February 1st, 1902.*

To the Salmon Canners of British Columbia:

GENTLEMEN:—We propose forming a company, with the object of amalgamating as many as possible of the canning plants of British Columbia, and desire to have your co-operation in the matter. The company will have a capital stock of $4,000,000, in shares of a par value of $100 each. Of this $1,500,000 is to be preference and $2,500,000 ordinary shares. The preference is to draw 7 per cent. cumulative dividends, and the dividend on the ordinary stock is for the present not to exceed 10 per cent. After paying the dividend on the preferred stock, 25 per cent of the net profits are to be set aside for the purpose of buying up and retiring 50 per cent. of the preferred stock issued. (This at the present time we expect will be $1,250,000, the remaining $250,000 being retained in the treasury for use in the future, if required.) The balance of the preferred stock outstanding is to be converted at some future date into ordinary stock at par. Thus the ultimate capitalization will be $3,250,000, all in ordinary stock.

The cash produced by selling the preference stock is to be used as part payment for the plants acquired, and to provide working capital for the new company.

The canneries are to be secured on a basis of part cash and part ordinary stock, and we estimate the proportion to be one-third cash and two-thirds stock. All stock, both preference and ordinary, is to be issued at $80, allowing the difference between that figure and the par value as a speculative profit.

We wish to lay particular stress upon the fact that the object of the proposed company is the amalgamation of the canning plants of British Columbia. It is not formed with the idea of buying them up and retiring the present owners, but to reorganize the business upon a sound basis that will insure larger and more permanent profits. It is the intention to close down a large proportion of the plants now in use, to enlarge the packing capacity of those we will operate, and to effect large economies in the cost of supplies, handling of pack, and the disposing of it in the world's markets. From the figures we have prepared we estimate the profits and savings on a basis of a 500,000 cases of salmon pack on the Fraser and 200,000 at northern points, will easily be one dollar a case or $700,000. This—if all the stock is issued—would provide $105,000 dividend on preference stock, $250,000 dividend on ordinary stock, $175,000 for reserve fund for redemption of preference stock outstanding, and would still leave $170,000 in the treasury for working capital. This estimate is exclusive of any saving that may be made in the cost of raw fish.

The plant and its equipment are to be acquired by the new company upon the above basis, but all supplies or materials on hand will be paid for in cash at an appraised value. The new company will also assume all contracts made for the coming season's work.

All of the cash necessary to carry out this proposition and to finance for the season's requirement has already been arranged for, so that the only work now remaining is the securing of the cannery properties.

Very truly yours,

HENRY DOYLE.

APPENDIX III.

Letter from Henry Doyle to A. G. Kittson & Co., dated 11th February 1902.

Source: The Doyle Papers, Special Collections Division, University of British Columbia.

Gentlemen:-

I enclose herewith prospectus covering a proposition to amalgamate all or as many as possible of the canning plants of British Columbia. Under ordinary circumstances I would have taken this up with your representative Mr. Anderson but learning he was in your city thought best to write now so that you could go into the matter with him in person.

As Mr. Anderson has doubtless told you the industry as far as the Fraser River is concerned is in a deplorable condition. The fishing grounds extend for only about 25 miles up from the Rivers mouth and in this distance 48 canning plants are in operation. Their competition was keen and in their efforts to obtain the advantage over their fellow canners, several of them started bidding up the price of raw fish; the others naturally followed, and as a consequence the cost of raw material steadily rose until the cost of packing exceeded the selling price.

When this was the condition efforts were made to retrench by reducing the price of fish, but the fishermen forming themselves into a union organisation resisted, and as a result the last two seasons have been prefaced by strikes. That the canners were the losers-although claiming victory-is shown by the fact that the fish in 1901, while just as plentiful as in 1897 cost 60¢ per case more, and the same number of plants were operated both the seasons mentioned.

A run of fish equal to that of last season cannot be expected before 1905 and as a consequence if present conditions continue to exist there is absolutely no prospect of any profits resulting from the next three years work. There will be no canners association the coming season to help maintain prices and present a more united resistence to the fishermens demands, as several of the most prominent have notified the others that the benefits of the Association were not equally distributed and as a consequence their operations in future would be on independent lines unless a permanent amalgamation could be effected.

It is to this latter end that I have been working. A company could not be formed to buy up the present plants for cash as the record of the past four years would not warrant the investment. An amalgamation on a strictly stock basis is also impossible as the majority of the packers are in a financial state that prevents their accepting such a proposition. To get around the difficulty I am arranging to provide enough cash to clear them of their indebtedness at the same time having them retain sufficient stock in the new company to make its welfare a paramount object to them.

By amalgamation enormous savings could be made as the business is largely over competed for at present, and as a consequence the cost of packing is far higher in proportion than it is on the American side of the line. By reducing the number of plants in operation, materially increasing the daily capacity of those we propose running, and by lowering the cost of raw fish by doing away with the excessive competition for the fishermen, we can bring our cost down to the same relative cost of the goods packed on Puget Sound and in Alaska.

I have interviewed nearly every canner in the Province and all are well disposed to come into the proposed amalgamation. Such companies as the Anglo British Columbia Pkg. Co. Ltd, United Canneries Ltd, and the Victoria Canning Co. are all heartily in favour of it and with the canneries they control secured, the amalgamation would have a splendid foundation to start with. Mr. Geo. I. Wilson who is also one of the largest interested in the Province is on your side of the water at present and if Mr. Anderson should have left for home before this reaches you I am sure he will explain any details that you desire.

I enclose a prospectus of the proposition together with form of option we are using. As to our ability to carry out the financial part of the proposal I would refer you to the London Manager of the Bank of Montreal who can give you full information as to whether I control the necessary capital and the personal standing and responsibility of those interested with me.

(From an unsigned carbon copy)

APPENDIX IV.

Letter from Henry Doyle to D. J. Munn, dated February 26th 1902.

Source: The Doyle Papers, Special Collections Division, University of British Columbia.

My Dear Munn,

Just a line in confirmation of my telegram. As explained therein my wire to Jarvis was sent with the object in view of having those of the committee who do not possess your technical knowledge put down a conservative sum as recompense for their services. Your figures as far as you are personally concerned I consider very reasonable indeed, but as a standard for the others it would not have been advisable to accept until the amounts required by the others was known. Jarvis in his telegram to me only said what your price was, no mention whatever of the balance.

I have wired him for information on this point and when received will telegraph him accepting your offer. In the meantime I expect my first telegram will have the desired effect of keeping the others down, as some of the larger concerns such as Rithet, and the other Victorians are kicking about amount set aside for promotion, not covering cost of starting company, paying expenses of committee, etc. They claim to believe that these preliminary expenses will easily reach $50,000 and it is with the object to proving them wrong well as for economy that I am so particular.

I will see Ewen as soon as possible as I assume you have communicated with him. I hope however you will make your mind easy on the present question as my reasons for telegraphing were entirely different from your construction of them, and I have no doubt at all of seeing you out here on the committee if I am successful at this end.

Progress is very slow but very satisfactory. I have options on ten and expect about as much more by the weeksend. All the Victoria parties seem very favourable and I have every reason to expect them all, but with Rithet in Frisco, and Findlay D and B, & the Federation head-offices in England there necessarily is some delay.

Todd is very favourable and very smart. He has submitted definite figures on his three plants (Beaver, Richmond and Inverness on Skeena) together with his "Horseshoe" brand but he says that as the latter has a value while most of the canneries have no goodwill to offer, the committee might not agree to accept his price. In giving me an option he says that he knows the fact of his having done so will assist greatly in getting others in, and if he is then dropped out he would have assisted in strengthening his opposition at loss to himself. He is ready to-day to sign the option but will only do so provided the committee will agree beforehand on accepting his price provided 60% are secured. Of course what he says is undoubtedly true and it may be

advisable to accede to his request. I have wired Jarvis about it and if the committee through your knowledge of the property decide to pass the question of price before starting west I would have Murray & Sweeny go into the figures with me and if found reasonable we would so advise the committee.

With regards to Mrs Munn and the Premier

Very sincerely

(Carbon copy, hand written and signed Henry Doyle)

APPENDIX V.

Letter from J. H. Todd and Sons to Henry Doyle, dated May 19th 1902.

Source: The Doyle Papers, Special Collections Division, University of British Columbia.

J.H. TODD & SONS,
WHOLESALE GROCERS
AND COMMISSION MERCHANTS.
72 WHARF STREET.
P.O. DRAWER 661.

EXTRA QUALITY
HORSESHOE BRAND
FRESH
FRASER RIVER
SALMON
TRADE MARK REGISTERED
SALMON CANNERS
PROPRIETORS BEAVER & RICHMOND CANNERIES
FRASER RIVER, B.C.

Victoria B.C. May 19th 1902

Henry Doyle Esq
Vancouver

Dear Sir,

If you have no objection, we would like to have a list of the Canneries that have joined the New Company.

And also list of Officers, President, Vice President, Managing Director or Manager and the Directors.

Your of course know our reasons for not joining up to the present as we think we already make many of the savings that the New Company propose, and are in rather a different position from many who have not the means to carry on their business. Your company being successful there is no reason why we cannot join forces at some later time, and in any event to work in harmony with you for the general good of the trade.

We are,

Yours very truly,

J. H. Todd & Sons

APPENDIX VI.

A Note on Changes in Size Distributions of Companies in the Fraser River Salmon Canning Industry: 1887-1909.

1. Introduction.

The intention of this note is to analyse changes in size distributions of firms in the Fraser River salmon canning industry. Its methodology is similar to a large number of studies which have appeared in the last fifteen years and which have employed stochastic models in an effort to explain size changes among firms.(1) The time period used is the twenty-two year period extending from 1887 through 1909. The sub-periods 1887 to 1899 and 1897 to 1909 are also discussed.

2. Methodology.

Changes in size distributions of firms are described using transition matrices as represented in Table 1. Here the cell p_{23} for example, expresses the probability that a firm of rank size '2' in period 't' will have moved to rank size '3' in period 't+1'. Similarly the classes p_{10} to p_{60} represent the probability of a firm death in rank classes '1' to '6' respectively. The row p_{00} - p_{06} has been omitted. It represents the probabilities of potential entrants actually entering the industry (p_{01} - p_{06}) or remaining potential entrants (p_{00}) over the

(1) This work followed on a paper by S. J. Prais, "Measuring Social Mobility", Journal of the Royal Statistical Society, Series A, Vol. 118, 1955, pp. 55-66. The subject under discussion in the initial paper was the mobility between social classes. Later studies employed a similar approach applied to size distributions of firms. P. E. Hart and S. J. Prais, "The Analysis of Business Concentration: A Statistical Approach", Journal of the Royal Statistical Society, Series A, Vol. 119, 1956, pp. 150-181. See also I. Adelman, "A Stochastic Analysis of the Size Distributions of Firms", Journal of the American Statistical Association, Vol. 53, 1958, pp. 893-904. A comprehensive bibliography of more recent work is to be found in the work of Lars Engwall, "A Simulation Model of Changes in Concentration", Canadian Journal of Economics, Vol. 3, 1970. Also "Size Changes Among Business Firms", Metroeconomica, Vol. XXII, 1970, pp. 133-148.

TABLE VI:1

TRANSITION MATRIX

Rank in Period (t)	Rank in Period (t + 1) 0	1	2	3	4	5	6	Σ
1	p_{10}	p_{11}	p_{12}	p_{13}	p_{14}	p_{15}	p_{16}	1.00
2	p_{20}	p_{21}	p_{22}	p_{23}	p_{24}	p_{25}	p_{26}	1.00
3	p_{30}	p_{31}	p_{32}	p_{33}	p_{34}	p_{35}	p_{36}	1.00
4	p_{40}	p_{41}	p_{42}	p_{43}	p_{44}	p_{45}	p_{46}	1.00
5	p_{50}	p_{51}	p_{52}	p_{53}	p_{54}	p_{55}	p_{56}	1.00
6	p_{60}	p_{61}	p_{62}	p_{63}	p_{64}	p_{65}	p_{66}	1.00

period from 't' to 't+1'. The reason for omitting these cells is tied to the impossibility of calculating any meaningful value for p_{00}. The diagonal p_{11} to p_{66} expresses the probability of staying in the same class from one period to the next. All cells to the right of this diagonal represent the probabilities of growth while those to the left represent the probabilities of decline. Since the rows show the probabilities of transition from a particular class, the sum of the elements of each row must be unity.

In the studies of Adelman and Engwall the probabilities on the diagonal are greatest. Next in importance are transitions to neighbouring ranks. Almost all other cells contain such small probabilities as to be estimated as zero.

Adelman's study observed about 2,100 transitions. Engwall's regional studies observed from between 70 and 169 companies over a ten year period. The present note observes a maximum of 344 transitions in an industry consisting of 53 companies in a period of 22 years. Some facts about the distributions are given as Table 2.

Apart from the length of the time period involved, the number of observed transitions is also affected by the way in which the data is classified. Usually, class ranges are determined so that the upper limit is twice the lower limit. The reasoning behind this is the assumed validity of Gibrat's law, that the probability of an X% rate of firm growth is independent of initial firm size.(2) Thus the appropriateness of geometrically determined class intervals. A further problem which appears in the other works cited is to take account of price changes when the usual measure of size in monetary units is used. We have avoided this problem by assuming that price changes influence all firms in the same proportion. For the Fraser River salmon canning industry with its concentration in a relatively small geographical area and its fairly homogenous product this assumption would seem to be acceptable.

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(2) Lars Engwall, Canadian Journal of Economics, 1970, op. cit.

TABLE VI:2

FACTS ABOUT THE DISTRIBUTIONS

	1887-1909	1887-1899	1897-1909
Number of Firms(1)	53	39	40
Smallest Firm in Cases of Salmon(2)	3,970	3,970	4,366
Largest Firm in Cases of Salmon(2)	154,442	107,496	154,442
Number of Observations of Rank Change	344	162	152
Number of Firm Births	43	28	15
Number of Firm Deaths	43	11	30

(1) Companies packing less than 4,000 (rounded) cases of canned salmon per year are excluded. This allows exclusion of a number of "fly-by-night" operations.

(2) Calculated as the average output per year over any time period, t, where t covers a period of four years to take account of the biologically determined variation in salmon runs over a four year cycle.

On the basis of this rationale size has been measured purely in terms of physical output, i.e. cases of canned salmon.

With respect to calculating the probabilities of changes in size, maximum likelihood estimates are commonly employed.(3) Thus,

$$(1) \quad p_{k,k+1} = \left(\sum_{i=1}^{n} \sum_{t=1}^{T} a_{i,i+1,t} \right) / \left(\sum_{i=1}^{n} \sum_{j=0}^{n} \sum_{t=1}^{T} a_{i,j,t} \right)$$

$$(2) \quad p_{k,k} = \left(\sum_{i=1}^{n} \sum_{t=1}^{T} a_{i,i,t} \right) / \left(\text{"} \right)$$

etc.

where:

$p_{k,k+1}$ is the probability of moving to the neighbouring higher class.

$p_{k,k-1}$ " " " " " " " " " lower "

$p_{k,k}$ " " " " staying in the same class.

etc.

$a_{i,i+1}$ is the number of movements from class i to class i+1 during period t.

etc.

n is the number of classes.

T is the chosen time period.

Because of the biologically determined variation in the supply of fish which, on the Fraser, extends over a four year cycle, this study employs a time period, t, of four years. Thus:

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(3) Ibid.

t_1 extends from 1887 to 1890

t_2 extends from 1888 to 1891

.

.

.

t_{20} extends from 1906 to 1909,

and T is therefore 20.

Finally, the following class intervals have been chosen:

	CLASS					
	1	2	3	4	5	6
Lower Limit of Output ('000 cases of canned salmon/year)	4	8	16	32	64	128

Any company producing less than 4,000 cases of canned salmon per year in any t is assumed to have left the industry. This figure represents the smallest pack of any company which stayed in the industry for four consecutive years and serves to limit several obvious 'fly-by-night' operators from the discussion. Where a merger takes place, the largest firm involved is assumed to stay in business while the remainder drop out. A complete index of companies coming in and leaving the industry between 1887 and 1909 is given as Appendix I.(4) The production statistics used come from Department of Marine and Fisheries Reports, 1888 to 1911. Unfortunately data beyond 1909 is unavailable.

3. Empirical Study of Company Size in the Fraser River Salmon Canning Industry.

(i) Estimates of the Matrices

Estimates of the matrices are given in Tables 3, 4 and 5. The periods 1887 to 1899, 1897 to 1909 and 1887 to 1909 are considered.

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(4) This directory is complete in that all operations are included, even those designated as "fly-by-night".

TABLE VI:3

ESTIMATED TRANSITION MATRIX FOR THE FRASER RIVER SALMON CANNING INDUSTRY: 1887 TO 1909

Rank in Period (t)	Rank in Period (t + 1) 0	1	2	3	4	5	6	Σ
1	0.207	0.541	0.252	0	0	0	0	1.00
2	0.207	0.134	0.585	0.061	0	0.012	0	1.00
3	0.063	0	0.042	0.833	0.063	0	0	1.00
4	0	0	0	0.118	0.794	0.088	0	1.00
5	0	0	0	0	0.176	0.765	0.059	1.00
6	0	0	0	0	0	0.250	0.750	1.00

TABLE VI:4

ESTIMATED TRANSITION MATRIX FOR THE FRASER RIVER SALMON CANNING INDUSTRY: 1887 TO 1899

Rank in Period (t)	Rank in Period (t + 1)							
	0	1	2	3	4	5	6	Σ
1	0.120	0.520	0.360	0	0	0	0	1.00
2	0.146	0.122	0.634	0.073	0	0.024	0	1.00
3	0	0	0	0.933	0.067	0	0	1.00
4	0	0	0	0.067	0.933	0	0	1.00
5	0	0	0	0	0.091	0.909	0	1.00
6	0	0	0	0	0	0	0	0

TABLE VI:5

ESTIMATED TRANSITION MATRIX FOR THE FRASER RIVER SALMON CANNING INDUSTRY: 1897 TO 1909

Rank in Period (t)	Rank in Period (t + 1)							
	0	1	2	3	4	5	6	Σ
1	0.294	0.569	0.137	0	0	0	0	1.00
2	0.379	0.103	0.483	0.034	0	0	0	1.00
3	0.100	0	0.067	0.767	0.067	0	0	1.00
4	0	0	0	0.133	0.733	0.133	0	1.00
5	0	0	0	0	0.400	0.400	0.200	1.00
6	0	0	0	0	0	0.250	0.750	1.00

It can be seen that....

(a) the probabilities $p_{k,k}$ are the largest in all time periods.

(b) the probabilities $p_{k,(k \pm 1)}$ are generally but not always next in size.

(c) the probability of firm death is highest among small firms from classes 1 and 2.

(d) almost all other probabilities are estimated to be very close to or equal to zero.

(e) the probabilities of decline are greater than those of growth in the periods 1887-1909 and 1897-1909. The pattern varies during 1887-1899. This is shown in Table 6, below.

Apart from the noticeably larger incidence of firm deaths these results are fairly consistent with those of Adelman and Engwall.

(ii) Measures of Mobility

The derived matrices make it possible to estimate the average time spent in each class. The expression for the average time spent in the ith class is:

$$(3) \quad t_i^a = \frac{1}{1 - p_{ii}}$$

The results are given in Table 7. The following conclusions can be drawn:

(a) the average time spent in classes 1 and 2 is similar in all the time periods considered.

(b) the average time spent in classes 3 through 6 is from 3 to 6 times higher in the period 1887 to 1899 compared to the period 1897 to 1909.

(c) the average time taken to rise to class 6 from class 0 or alternatively to fall from class 6 to class 0 varies from 46 years on the basis of 1887-1899 data to only 18 years on the basis of 1897-1909 data. This is an indication of much greater mobility in the later period.

TABLE VI:6

PROBABILITY OF TRANSITIONS

Probabilities	1887-1909	1887-1899	1897-1909
$p_{k,k+3}$	0.003	0.008	0
$p_{k,k+2}$	0	0	0
$p_{k,k+1}$	0.139	0.174	0 096
Probability of Transition to a Higher Rank	0.142	0.182	0.096
$p_{k,k}$	0.645	0.682	0.603
$p_{k,k-1}$	0.149	0.090	0.199
$p_{k,k-2}$	0.057	0.045	0.081
$p_{k,k-3}$	0.010	0	0.022
Probability of Transition to a Lower Rank	0.216	0.135	0.303

TABLE VI:7

MEAN TIME SPENT IN THE VARIOUS CLASSES

(years)

Class	Statistic	1887-1909	1887-1899	1897-1909
1	$\bar{t}$	2.179	2.083	2.320
2	$\bar{t}$	2.410	2.732	1.934
3	$\bar{t}$	5.990	14.925	4.292
4	$\bar{t}$	4.854	14.925	3.745
5	$\bar{t}$	4.255	10.989	1.667
6	$\bar{t}$	4.000	-	4.000
$\sum_{i=1}^{6} \bar{t}_i$		23.688	45.654	17.815

(d) taken overall the chances of firm survival are greatest for firms of rank classification 3, i.e. producing 16,000 to 32,000 cases of canned salmon per year.

(e) chances of firm survival are poorest for class 1 and 2 firms producing less than 16,000 cases per year and for class 5 firms producing 64,000 to 128,000 cases per year between 1897 and 1909. See Table 8.

(iii) Measures of Concentration

Gini's coefficient of concentration (4) has been calculated for all t and the results are given in Table 9. Other results at hand show figures of from 0.272 to 0.437 for the world's major industrial areas between 1956 and 1965.(5) Some conclusions suggest themselves:

(a) in all t but two the degree of concentration in the Fraser River salmon canning industry is significantly higher than available current economy-wide estimates.

(b) the advent of the Anglo-British Columbia Packing Company, first felt in t_2, raised the degree of concentration significantly. However, by t_{12} the industry had largely reverted to the pre-merger level of concentration. A closer examination of the statistics shows that the erosion of the basis of high concentration was caused by the emergence of new entrants in class 1 and their subsequent growth to class 2.

(c) the advent of the British Columbia Packers' Association of New Jersey, first felt in t_{13}, again had a considerable effect on the degree of concentration. In later periods, however, the high degree of concentration was maintained in contrast to the earlier period.

4. Implications.

The empirical study carried out above gives little weight to

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(5) Gini's coefficient is a measure of the area lying between the actual Lorenz curve and the equidistribution Lorenz curve. For example see Franco Modigliani, "New Developments on the Oligopoly Front", Journal of Political Economy, Vol. LXVI, 1958, pp. 215-232.

TABLE VI:8

PROBABILITIES FOR STEPS TO OTHER RANKS

Rank	1887-1909	1887-1899	1897-1909
1	0.459	0.480	0.431
2	0.415	0.366	0.517
3	0.167	0.067	0.233
4	0.206	0.067	0.266
5	0.235	0.091	0.600
6	0.250	-	0.250

TABLE VI:9

GINI COEFFICIENTS

Time Period, t	Years	Gini's Coefficient
t_1	1887-1890	0.371
t_2	1888-1891	0.445
.	.	0.471
.	.	0.601
.	.	0.577
.	.	0.561
.	.	0.523
.	.	0.540
.	.	0.540
t_{10}	1896-1899	0.471
t_{11}	1897-1900	0.454
.	.	0.392
.	.	0.526
.	.	0.489
.	.	0.531
.	.	0.606
.	.	0.612
.	.	0.626
.	.	0.640
t_{20}	1906-1909	0.553

the argument that large companies of size 4 and greater have much, if anything to gain from economies of scale. Note that -

1. The firms with the best survival rates in the three time periods considered are fairly small companies with a pack of from 16,000 to 32,000 cases of canned salmon per year. Typically this is accomplished by the production efforts of only two canneries.

2. The survival rate of large firms of class 5 and 4 declines rapidly after 1897.

3. Some firms survived over a long period at pack levels below class 3. The outstanding example is the British Columbia Canning Company (code #5) which survives throughout the whole twenty-two year period with usually a pack average of only class 1.

4. Taking the period as a whole in all but the lowest class of firm size there is a tendency for decline rather than growth. This tendency becomes especially significant after 1897.

The following conclusions seem to be justified with respect to economies of scale. There are economic advantages in growing from a very small to a class 3 company size. However, there are no significant extra gains to be made by growing beyond this point. In fact, after 1897 there seem to be disadvantages to growth beyond class 3 and the significant tendency was for firms of higher rank to decline.

On the other hand there is some evidence to suggest that changes in firm size are motivated by expected monopoly profits through the achievement of unusually high levels of industrial concentration. We have shown elsewhere that these profits would specifically relate to market power in input markets and consequent cost reductions. Note in this context that -

1. The high degree of concentration in the industry was most threatened by the growth of companies of class 2 size.

2. Eighty-two percent of all companies dying in the class 2 range were merged with larger companies. The British Columbia Packers' Association of New Jersey for example incorporated a firm of rank size 4. Yet we find no evidence of gains from scale at this level of operations.

3. The chances for a firm to grow beyond class 2 are extremely small.

4. In spite of the wholesale disappearance of class 2 companies there is little evidence of net growth of firms of larger size.

We conclude that changes in the size distribution of firms in the Fraser River salmon canning industry over the period 1887 to 1909 reflect the means to protect an unusually high degree of industrial concentration and a corresponding high degree of market power.

5. Conclusion.

This note supplements the preceding text which set out to determine the motives behind merger movements among firms making up the Fraser River salmon canning industry. There it was tentatively suggested that expected monopsony profits rather than economies of scale motivate the major changes in the size distribution of firms. In this note we have switched our attention from expectations to actualities. And the result has been to confirm the earlier study. No significant economies of scale are noted beyond the medium-small firm size. What dominates the picture is the relationship between changes in the size distribution of firms and the maintenance of high levels of industrial concentration.

The methodological approach adopted seems to be useful in describing size changes among firms. Of course, the conclusions of the study depend very much on the quality of the estimates of probabilities which form the transition matrices. Some short-comings are to be expected as the number of observed transitions is relatively small. We are particularly short in the upper classes 5 and 6. However, in the end the general nature of the matrices seems to be quite comparable with earlier work.

APPENDIX VII

DATA ON THE PACIFIC SALMON

I. Pack of Canned Salmon, Major Streams; World Production.

II. A. Pack of Canned Salmon, Minor Streams - Outside of British Columbia.

B. Pack of Canned Salmon, Minor Streams - Within British Columbia.

III. Pack of Canned Salmon, Growth, 1880-1913.

IV. Exports of Canned Salmon by Quantity, Value and Destination; Export Prices.

I. DATA ON THE PACIFIC SALMON

PACK OF CANNED SALMON, Major Streams

YEAR	WORLD PACK OF PACIFIC SALMON	FRASER RIVER SYSTEM						COLUMBIA RIVER SYSTEM		ALASKA	
		FRASER RIVER		PUGET SOUND, WASHINGTON		VICTORIA					
	Total Cases	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack
1880	687,010	42,155	6	5,100	1	-	-	530,000	77	6,539	1
1881	938,273	142,516	15	8,500	1	-	-	550,000	59	8,977	1
1882	1,045,092	199,204	19	7,900	1	-	-	541,300	52	21,745	2
1883	1,014,865	109,701	11	1,500	0	-	-	629,400	62	48,337	5
1884	925,451	38,437	4	5,500	1	-	-	620,000	67	64,886	7
1885	857,042	89,617	11	12,000	1	-	-	553,800	65	82,415	10
1886	857,276	99,177	12	17,000	2	-	-	448,500	52	142,065	17
1887	899,256	130,088	15	22,000	2	-	-	356,000	40	206,677	23
1888	1,217,792	76,616	6	21,975	2	-	-	372,477	31	412,115	34
1889	1,614,066	303,875	19	11,674	1	-	-	309,885	19	719,169	45
1890	1,609,696	241,889	15	8,000	1	-	-	435,774	27	682,591	42
1891	1,578,746	178,954	11	20,529	1	-	-	398,953	25	801,400	51
1892	1,354,083	79,715	6	26,426	2	-	-	487,338	36	474,717	35
1893	1,876,915	457,797	24	89,774	5	-	-	415,876	22	643,654	34
1894	1,887,150	363,967	19	95,400	5	-	-	490,100	26	686,440	36
1895	2,169,848	400,368	19	179,968	8	-	-	634,696	29	626,530	29
1896	2,408,812	356,984	15	195,664	8	-	-	481,697	20	966,707	40
1897	3,124,609	860,459	28	494,026	16	-	-	552,721	18	909,078	29
1898	2,484,722	256,101	10	400,200	16	-	-	487,944	20	965,097	39
1899	3,257,825	510,383	16	919,611	28	-	-	332,774	10	1,078,146	33
1900	3,091,542	316,522	10	469,450	15	-	-	358,772	12	1,548,139	50
1901	5,186,407	990,252	19	1,380,590	27	-	-	390,183	8	2,016,804	39
1902	4,194,558	327,095	8	581,659	14	-	-	317,143	8	2,436,824	58
1903	3,607,073	237,125	7	478,488	13	-	-	339,577	9	2,246,210	62
1904	3,276,882	128,903	4	291,488	9	-	-	395,104	12	1,953,756	60
1905	4,607,087	877,136	19	1,018,641	22	-	-	397,273	9	1,894,516	41
1906	3,817,776	240,486	6	430,602	11	-	-	394,898	10	2,219,044	58
1907	3,846,677	163,116	4	698,080	18	24,525	1	324,171	8	2,169,873	56
1908	3,962,317	89,184	2	448,765	11	23,241	1	253,341	6	2,606,973	66
1909	5,391,186	567,203	11	1,632,949	30	56,266	1	274,087	5	2,395,477	44
1910	4,326,453	223,148	5	567,883	13	24,846	1	391,415	9	2,413,054	56
1911	6,147,486	301,344	5	1,557,029	25	30,030	0	543,331	9	2,820,066	46
1912	6,011,955	173,921	3	416,125	7	25,401	0	285,666	5	4,060,129	68
1913	8,242,847	732,059	9	2,583,463	31	50,370	1	266,479	3	3,746,493	46

II. DATA ON THE PACIFIC SALMON

A. PACK OF CANNED SALMON, Minor Streams - Outside of British Columbia

YEAR	WORLD PACK OF PACIFIC SALMON	SACRAMENTO-MONTEREY DISTRICT		NORTHERN CALIFORNIA COAST		WILLAPA HARBOUR		COASTAL STREAMS OF OREGON		NORTHERN WASHINGTON COAST		JAPAN		SIBERIA	
	Total Cases	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack
1880	687,010	62,000	9	13,750	2	-	-	7,772	1	-	-	-	-	-	-
1881	938,273	181,200	19	-	-	-	-	12,320	1	-	-	-	-	-	-
1882	1,045,092	200,000	19	-	-	-	-	19,186	2	-	-	-	-	-	-
1883	1,014,865	123,000	12	-	-	-	-	16,156	2	-	-	-	-	-	-
1884	925,451	81,450	9	-	-	-	-	12,276	1	-	-	-	-	-	-
1885	857,042	90,000	11	-	-	-	-	9,310	1	-	-	-	-	-	-
1886	857,276	39,300	5	-	-	-	-	49,147	6	-	-	-	-	-	-
1887	899,256	36,500	4	-	-	-	-	73,996	8	-	-	-	-	-	-
1888	1,217,792	68,075	6	6,747	0	22,500	2	92,863	8	37,000	3	-	-	-	-
1889	1,614,066	57,300	4	-	-	-	-	98,800	6	-	-	-	-	-	-
1890	1,609,696	25,065	2	-	-	-	-	47,009	3	-	-	-	-	-	-
1891	1,578,746	19,353	1	-	-	8,000	1	24,500	2	500	0	-	-	-	-
1892	1,354,083	2,281	0	-	-	14,500	1	83,600	6	16,500	1	-	-	-	-
1893	1,876,915	23,336	1	3,100	0	16,195	1	52,778	3	22,000	1	-	-	-	-
1894	1,887,150	28,463	2	3,200	0	15,100	1	54,815	3	21,400	1	-	-	-	-
1895	2,169,848	25,185	1	3,850	0	22,600	1	77,878	4	11,449	1	-	-	-	-
1896	2,408,812	13,387	1	-	-	24,941	1	87,360	4	21,274	1	-	-	-	-
1897	3,124,609	38,543	1	-	-	29,600	1	60,158	2	13,300	0	-	-	-	-
1898	2,484,722	29,731	1	-	-	21,420	1	75,679	3	12,100	1	-	-	-	-
1899	3,257,825	32,580	1	1,600	0	21,314	1	82,041	3	24,240	1	-	-	-	-
1900	3,091,542	39,304	1	-	-	26,300	1	12,237	0	30,800	1	-	-	-	-
1901	5,186,407	17,500	0	-	-	34,000	1	58,618	1	41,500	1	-	-	-	-
1902	4,194,558	14,043	0	2,500	0	39,492	1	44,236	1	31,500	1	-	-	-	-
1903	3,607,073	8,200	0	-	-	5,890	0	54,861	1	-	-	-	-	-	-
1904	3,276,882	14,407	0	3,400	0	26,400	1	98,874	3	27,559	1	-	-	-	-
1905	4,607,087	2,780	0	-	-	14,950	0	89,055	2	22,050	0	-	-	-	-
1906	3,817,776	-	-	-	-	14,440	0	197,332	5	22,000	1	-	-	-	-
1907	3,846,677	-	-	-	-	13,382	0	79,712	2	14,000	0	-	-	-	-
1908	3,962,317	-	-	-	-	20,457	1	52,478	1	14,000	0	-	-	-	-
1909	5,391,186	-	-	5,633	0	12,024	0	58,169	1	19,787	0	-	-	-	-
1910	4,326,453	-	-	14,016	0	14,508	0	103,617	2	51,130	1	-	-	10,000	0
1911	6,147,486	4,142	0	7,604	0	25,850	0	153,828	3	61,671	1	-	-	25,000	0
1912	6,011,955	-	-	33,200	1	24,887	0	77,765	1	54,507	1	-	-	63,100	1
1913	8,242,847	950	0	6,376	0	8,422	0	42,441	1	54,922	1	46,000	1	133,400	2

II. DATA ON THE PACIFIC SALMON (cont.)

B. PACK OF CANNED SALMON, Minor Streams - Within British Columbia.

	SKEENA RIVER		RIVERS INLET		OTHER BRITISH COLUMBIA	
B.						
Year	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack	Total Cases	Percentage of World Pack
1880	19,694	3	-	-	-	-
1881	21,560	2	-	-	13,200	1
1882	24,522	2	5,635	1	25,700	2
1883	31,157	3	10,780	1	44,654	4
1884	53,986	6	20,383	2	28,433	3
1885	12,900	2	-	-	6,000	1
1886	37,587	4	15,000	2	9,500	1
1887	58,592	7	11,203	1	4,200	1
1888	70,106	6	20,000	2	17,318	1
1889	58,165	4	25,704	2	26,575	2
1890	90,509	6	32,961	2	43,579	3
1891	78,135	5	34,924	2	18,880	1
1892	90,280	7	15,126	1	43,349	3
1893	59,675	3	35,266	2	37,491	2
1894	61,151	3	39,351	2	29,902	2
1895	67,797	3	58,579	3	39,651	2
1896	100,140	4	107,468	5	36,978	2
1897	65,905	2	40,207	1	48,906	2
1898	81,234	3	104,711	4	42,115	2
1899	108,206	3	71,079	2	42,949	1
1900	128,529	4	75,413	2	64,949	2
1901	126,092	2	66,840	1	52,972	1
1902	154,875	4	70,298	2	73,714	2
1903	98,669	3	69,390	2	68,490	2
1904	154,869	5	94,292	3	87,830	3
1905	114,085	3	83,122	2	93,117	2
1906	162,420	4	122,878	3	103,676	3
1907	159,255	4	94,064	2	106,499	3
1908	209,177	5	75,090	2	145,997	4
1909	140,739	3	91,014	2	112,698	2
1910	222,035	5	129,398	3	162,774	4
1911	254,410	4	101,066	2	262,115	4
1912	254,258	4	137,697	2	405,299	7
1913	164,055	2	68,096	1	339,321	4

III. DATA ON THE PACIFIC SALMON.

PACK OF CANNED SALMON, GROWTH, 1880-1913.

WORLD PACK OF CANNED SALMON

YEAR	Total Cases	Percentage Growth
1880	687,010	-
1881	938,273	+37
1882	1,045,092	+11
1883	1,014,865	- 3
1884	925,451	- 9
1885	857,042	- 7
1886	857,276	0
1887	899,256	+ 5
1888	1,217,792	+35
1889	1,614,066	+33
1890	1,609,696	0
1891	1,578,746	- 2
1892	1,354,083	-14
1893	1,876,915	+39
1894	1,887,150	+ 1
1895	2,169,848	+15
1896	2,408,812	+11
1897	3,124,609	+30
1898	2,484,722	-20
1899	3,257,825	+31
1900	3,091,542	- 5
1901	5,186,407	+68
1902	4,194,558	-19
1903	3,607,073	-14
1904	3,276,882	- 9
1905	4,607,087	+41
1906	3,817,776	-17
1907	3,846,677	+ 1
1908	3,962,317	+ 3
1909	5,391,186	+36
1910	4,326,453	-20
1911	6,147,486	+42
1912	6,011,955	- 2
1913	8,242,847	+37

IV. DATA ON THE PACIFIC SALMON

EXPORTS OF CANNED SALMON BY VALUE AND QUANTITY, 1874-1913

	TOTAL CANADIAN EXPORTS				EXPORTS TO THE UNITED KINGDOM			EXPORTS TO THE UNITED STATES		
YEAR	Cases	Value in $'000s	Price Per Case $	Value of B. C. Exports As Percentage of Total	Value in $'000s	Price Per Case $	Percentage of Total Canned Salmon Exports by Value	Approx. Value in $'000s	Price Per Case $	Percentage of Total Canned Salmon Exports by Value
1874	27,999	204	7.286	19	175	8.564	86	25	3.565	12
1875	32,204	251	7.794	41	199	7.867	79	20	7.353	8
1876	15,900	96	6.038	52	51	6.108	53	27	5.983	28
1877	12,198	82	6.722	87	55	6.625	67	3	6.012	4
1878	69,321	408	5.886	96	162	6.457	40	203	5.407	50
1879	103,438	615	5.946	95	400	6.023	65	165	5.849	27
1880	60,252	303	5.029	97	265	5.065	88	33	4.680	11
1881	59,254	298	5.029	100	279	5.027	94	18	5.162	6
1882	156,000	897	5.750	"	845	5.787	94	31	5.319	4
1883	228,692	1,156	5.055	"	1,130	5.052	98	5	6.570	0
1884	153,092	802	5.239	"	681	5.277	85	98	5.077	12
1885	105,020	511	4.866	99	423	4.914	83	28	4.869	6
1886	85,150	414	4.862	98	366	4.851	88	15	4.836	4
1887	111,146	602	5.416	100	527	5.405	88	23	6.829	4
1888	172,983	919	5.313	"	806	5.424	88	2	5.155	0
1889	140,385	753	5.364	"	592	5.357	79	16	5.534	2
1890	373,418	2,070	5.543	"	1,923	5.537	93	64	6.318	3
1891	331,994	1,745	5.256	"	1,521	5.378	87	2	5.051	0
1892	257,670	1,255	4.871	"	1,156	4.900	92	5	3.117	0
1893	171,240	870	5.081	"	847	5.091	97	0	6.435	0
1894	500,877	2,387	4.766	"	2,328	4.784	98	1	4.149	0
1895	427,591	2,009	4.698	99	1,935	4.698	96	0	4.125	0
1896	468,367	2,537	5.417	95	2,476	5.436	98	15	3.987	1
1897	582,539	2,856	4.903	98	2,776	4.916	97	0	3.867	0
1898	867,646	3,430	3.953	98	3,238	3.967	94	6	3.774	0
1899	540,462	2,407	4.454	-	2,296	4.581	95	47	2.423	2
1900	771,089	2,883	3.739	-	2,646	3.736	92	19	4.210	1
1901	736,321	2,889	3.924	-	2,322	3.965	80	336	3.575	12
1902	1,027,139	5,013	4.881	-	4,736	4.956	95	25	3.980	1
1903	485,885	2,590	5.330	-	2,459	5.445	95	0	3.913	0
1904	327,658	1,772	5.408	-	1,533	6.024	87	3	4.545	0
1905	269,763	1,679	6.224	-	1,334	6.808	80	16	3.962	1
1906	957,878	4,943	5.160	-	4,353	5.121	88	222	6.877	5
1907	319,842	1,992	6.228	-	1,622	6.378	81	52	7.037	3
1908	469,273	2,898	6.176	-	2,362	6.298	82	39	5.340	1
1909	377,529	2,468	6.537	-	2,099	6.795	85	17	5.747	1
1910	722,835	4,368	6.043	-	3,825	6.168	88	14	5.677	0
1911	534,081	3,669	6.870	-	2,936	7.168	80	21	6.779	1
1912	629,019	3,830	6.089	-	2,919	6.095	76	19	7.361	1
1913	479,199	3,484	7.270	-	2,605	7.815	75	2	8.547	0

APPENDIX VII.

Sources:

Tables I - III

Packs for all areas outside of British Columbia; world production figures, 1887 to 1913. Otis W. Freeman, "Salmon Industry of the Pacific Coast", Economic Geography, Vol. 11, 1935, pp. 109-139.

Pack figures for British Columbia regions. Cicely Lyons, Salmon Our Heritage, Mitchell Press, Vancouver, 1969, pp. 705-708.

World production figures, 1880 to 1886. Otis W. Freeman, op. cit., adjusted to correct for British Columbia pack statistics given in Cicely Lyons, op. cit., pp. 705-706.

Table IV

Source. Exports. Canada, S.P., various.

British Columbia production percentages calculated for 1874 to 1902. Canada, S.P., Annual reports of the Department of Fisheries.

British Columbia production percentages calculated for 1903 to 1913. Canada, S.P., Reports of the Commissioner of Fisheries, British Columbia.

Export figures are for fiscal years,
(i) ending June 30th, 1874 to 1906,
and (ii) ending March 31st, 1907 to 1913.

British Columbia production figures are for
(i) the calendar year, 1874 to 1906,
and (ii) the fiscal year ending March 31st, 1907 to 1913.

The export quantity and value data for Table IV appear in Carrothers, W. A., The British Columbia Fisheries, The University of Toronto Press, Toronto, 1941, pp. 15-16.

APPENDIX VIII.

Pack of Fraser River Fish and the Impact of the Growth of Puget Sound Production, 1880-1913.

TABLE VIII:1

INDEX OF PACK OF FRASER RIVER CANNERIES, 1880-1913

(Average Pack, 1887-1890 = 100)

Four Year Cycle Beginning	Dominant Year	Sub-Dominant Year	Poor Years	
			#1	#2
1877	-	-	-	22
1881	76	106	58	20
1885	48	53	69	41
1889	162	129	95	42
1893	243	194	213	190
1897	457	136	271	168
1901	526	174	126	69
1905	466	128	87	47
1909	302	119	160	93
1913	389	-	-	-

TABLE VIII:2

FRASER RIVER CANNERIES' PACK AS PERCENTAGE OF WORLD PRODUCTION OF CANNED PACIFIC SALMON 1880-1913

Four Year Cycle Beginning	Dominant Year	Sub-Dominant Year	Poor Years	
			#1	#2
1877	-	-	-	6
1881	15	19	11	4
1885	11	12	15	6
1889	19	15	11	6
1893	24	19	19	15
1897	28	10	16	10
1901	19	8	7	4
1905	19	6	4	2
1909	11	5	5	3
1913	9	-	-	-

TABLE VIII:3

INDEX OF PACK OF FRASER RIVER FISH,* 1880-1913

(Average Pack, 1887-1890 = 100)

Four Year Cycle Beginning	Dominant Year	Sub-Dominant Year	Poor Years	
			#1	#2
1877	-	-	-	23
1881	74	102	55	22
1885	50	57	75	48
1889	155	123	98	52
1893	268	225	284	271
1897	664	322	701	385
1901	1,162	445	351	206
1905	929	329	434	275
1909	1,106	400	926	302
1913	1,650	-	-	-

* Fraser River Fish includes all fish caught on Puget Sound and at Victoria as well as by Fraser River fishermen.

TABLE VIII:4

PACK OF FRASER RIVER FISH* AS PERCENTAGE OF WORLD PRODUCTION OF CANNED PACIFIC SALMON 1880-1913

Four Year Cycle Beginning	Dominant Year	Sub-Dominant Year	Poor Years	
			#1	#2
1877	-	-	-	7
1881	16	20	11	5
1885	12	14	17	8
1889	20	16	13	8
1893	29	24	27	23
1897	43	26	44	25
1901	46	22	20	13
1905	41	18	23	14
1909	42	19	31	10
1913	41	-	-	-

* Fraser River Fish includes fish caught on Puget Sound and at Victoria as well as by Fraser River fishermen.

TABLE VIII:5

PUGET SOUND, WASHINGTON, PACK AS PERCENTAGE OF WORLD PRODUCTION OF CANNED PACIFIC SALMON 1880-1913

Four Year Cycle Beginning	Dominant Year	Sub-Dominant Year	Poor Years	
			#1	#2
1877	-	-	-	1
1881	1	1	0	1
1885	1	2	2	2
1889	1	1	1	2
1893	5	5	8	8
1897	16	16	28	15
1901	27	14	13	9
1905	22	11	18	11
1909	30	13	25	7
1913	31	-	-	-

TABLE VIII:6

CATCH OF FRASER RIVER FISH BY REGION, 1880-1913

Year	Fraser River %	Puget Sound, Washington %	Victoria %
1880	89	11	0
1881	94	6	0
1882	96	4	0
1883	99	1	0
1884	88	12	0
1885	88	12	0
1886	85	15	0
1887	86	14	0
1888	78	22	0
1889	96	4	0
1890	97	3	0
1891	90	10	0
1892	75	25	0
1893	84	16	0
1894	79	21	0
1895	69	31	0
1896	65	35	0
1897	64	36	0
1898	39	61	0
1899	36	64	0
1900	40	60	0
1901	42	58	0
1902	36	64	0
1903	33	67	0
1904	31	69	0
1905	46	54	0
1906	36	64	0
1907	18	79	3
1908	16	80	4
1909	25	72	3
1910	27	70	3
1911	16	82	2
1912	28	68	4
1913	22	77	1

APPENDIX IX.

TABLE IX:1

NET LICENCES ISSUED ON THE FRASER RIVER
BY ETHNIC GROUP

	1891-1894		1901-1904	
	No. Per Year	Percentage	No. Per Year	Percentage
White	372	37	1,248	44
Indian	441	43	349	12
Japanese	203	20	1,251	44
TOTAL	1,016	100	2,848	100

Sources: 1891-1894, Rounsefell and Keles, Fraser River Salmon Fisheries, Washington, 1938, p. 706, as quoted in H. Keith Ralston, Thesis, 1965, op. cit., p. 48.

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