APPENDIX D

DEVELOPMENT OF LANDED WEIGHT:PRODUCT WEIGHT CONVERSION FACTORS

TABLE OF CONTENTS FOR APPENDIX D

LIST OF APPENDIX D TABLES

This page intentionally left blank.

DEVELOPMENT OF LANDED WEIGHT: PRODUCT WEIGHT CONVERSION FACTORS

1. INTRODUCTION

For most of the period covered by this report (1828-1950), estimation of landed weights of salmon required converting data on product weights from Department of Marine and Fisheries (DMF) and Dominion Bureau of Statistics (DBS) Annual reports and other sources into live weights ("green landed weights" or GLW) through the use of a series of appropriate conversion factors.

This Appendix details the methods we used to make those conversions. We first identify the different types of products that have been produced by the British Columbia fishing industry, next we define the types of measurements utilised in published and archival records to describe the quantities of products processed, and then we provide product to GLW conversion factors for each type of product. The methods section of the main text details the procedures we used to assemble our final data (annual GLW by area and species) from the products and canned packs. Readers may skip to the product weights and conversion factors that were used to generate GLW in the text tables by going directly to Table D8.

2. BACKGROUND

As outlined in the main text, the first commercial use of Pacific salmon by Europeans was by the Hudson's Bay Company in the early 1800s. The Hudson's Bay Company obtained its supplies of dried salmon from Aboriginals and actively exchanged the finished product among the posts. Dried salmon (mainly smoked), measured in terms of numbers of individual fish or "pieces", was to both British Columbia Aboriginal people and white traders what pemmican (dried buffalo meat) was to Aboriginal and white inhabitants of the prairies in the 18th and 19th Centuries.[1]

The export trade of salmon from British Columbia began in the early 1830s when the Fort Langley post began to prepare barrels of wet-salted (pickled) salmon for shipment overseas, mainly to Hawaii. In the 1860s, private entrepreneurs entered the commercial field and, by the 1870s, had largely replaced the Hudson's Bay Company in the fisheries trade. From 1910 onward, production of pickled salmon and of most other products, other than canned salmon, was recorded in pounds or hundredweight (cwt). Prior to that time, production was usually measured in barrels. In the early Hudson's Bay Company days and before the federal Department of Marine and Fisheries instituted a standard system of reporting, other types of containers (tierces, hogsheads, boxes and packages) were also listed (Table D1).

The advent of canning in the early 1870s revolutionised the industry and within 25 years fleets and factories rivalling those of the 20th Century were operating throughout British Columbia. From the early 1880s through 1950, canned products dominated the commercial salmon trade generally accounting for well over 70 percent of landings. Traditionally, canned

1. For a summary of the early history of the fishery see Shepard and Argue (1989).

production has been measured in terms of standardised 48-lb cases, but in the early years of the fishery, other sizes of containers were used.

From the beginning of the commercial fishery there was also trade in fresh salmon; however, official records of the sale of fresh salmon do not begin until 1879 on the Fraser River (Table D1). In the earliest years of record keeping, fresh production was measured in terms of numbers of fish, but it was not long before pounds of fish became the standard. Records of trade in dry-smoked salmon (first in terms of value and then in terms of both poundage and value) began appearing in Dominion records in 1877 in Victoria. Around the turn of the Century records of other products began to appear. A vigorous trade with the Orient in dry-salted salmon began in 1897 and preserved salmon roe was added in 1900. These products have always been recorded in terms of poundage. Records of production of mild cured and frozen salmon first appeared in 1906. Production of frozen salmon was always in terms of poundage, but until 1910 mild cured production was measured in tierces. Beginning in the 1920s, substantial quantities of salmon (recorded in terms of poundage) were used for bait, principally in the longline fishery for halibut.

3. WEIGHTS AND MEASURES

Table D1 summarises the units of volume or weight used in source documents to record quantities of processed salmon products. Available information on the weights of products contained in the various units used for marketing and shipping is outlined below.

3.1. Barrels of Pickled Salmon

Between 1828, when the first experimental pickling of salmon was carried out by the Hudson's Bay Company at Fort Langley, and the termination of the Company's fisheries operation in the early 1870s, most salmon were packed in barrels. Shepard and Argue (1989) concluded that by 1830, the Company had standardised the contents of its barrels at 180 lb of product. However, salmon were also packed in "tierces", "hogsheads" and half barrels. On the basis of information on the numbers of salmon packed in barrels, Shepard and Argue concluded that the content of a Hudson's Bay tierce was about twice the content of a barrel, or 360 lb of product. In 1835, in addition to barrels and tierces, Company records indicated that some salmon were packed in hogsheads. The net weight of products packed in hogsheads is unclear. According to the Oxford Dictionary (1996), in terms of liquid measures, the capacity of a hogshead is about 1.4 times that of a barrel (50 Imperial gallons for a hogshead compared to 35-36 gallons for a barrel). On this basis, a hogshead would have contained about 250 pounds of product.

The first non-Hudson's Bay Company record of wet salted salmon production is found in the Colonial Office Bluebook of Statistics for the Colony of British Columbia for 1861. Here it is noted that 6 boats had fished with a production "of ... 1,085 barrels of Salmon of 200 lbs each and ... barrels of Sturgeon of 200 lbs each."[2]

Although different from the Hudson's Bay standard discussed above, the 200-lb capacity was to become universal throughout the North American independent Pacific salmon fishery. For

2. Colony of British Columbia. 1862. Bluebook for 1861.

example, in its 1913 Yearbook, the periodical "Pacific Fisherman" noted that pickling barrels used in Southeast Alaska held 200 lb. The same issue stated that in United States' law a barrel was defined as containing "two hundred pounds of fish or fifty gallons of oil". In his extensive review of the Pacific salmon industry, first published in 1911, Cobb (1930) stated that in the pickling process:

> ... *one sack of salt* [was] *used to every three barrels of 200 pounds each. About 40 to 52 red salmon, 25 to 35 coho salmon, 70 to 80 humpback salmon, 10 to 14 king salmon, and 25 to 30 dog salmon are required in packing a barrel of pickled salmon.*

On the basis of the above evidence, it is assumed that in the non-Hudson's Bay Company fishery on the Fraser in the 1860s, barrels of pickled salmon contained 200 lb of product each.

There remains a footnote to this discussion of containers to transport pickled salmon - the use of the term "kit". The origin of the term kit is unknown. The Oxford Dictionary (1996) gives one meaning of the word kit in British usage as "a wooden tub". Use of the term kit in British Columbia may have come from Hudson's Bay Company days; in a February 24, 1851 letter to Thomas Yale of the Fort Langley Post, Sir James Douglas stated that:

> *I send you by bearer a model kit or vessel for putting up salmon, a far more profitable method than putting up barrel* (outward correspondence from Fort Victoria. HBC Archive A/C/20/vi3Da).

There is no further information in the files on the use of such kits by the HBC - all records of pickled salmon after 1851 continued to be expressed in terms of barrels. Annual Reports of the Dominion Department of Marine and Fisheries (DMF) for 1879 and 1880 list pickled fish production in terms of barrels, half barrels and kits. In 1879, the value of a full barrel was listed as $8, whereas a kit was listed at only $3. In 1880, prices for barrels, half barrels and kits were $8, $5 and $3 respectively. Considering such unit prices, our best guess is that kits were quarter barrels (half barrels were priced at about 60% of the price of a full barrel and the price of kits bore approximately the same relationship to that of half barrels).

In deriving estimates of production between 1860 and 1877, Shepard and Argue (1989) used Customs' information on exports. The Customs' data did not list the type of container used to ship pickled fish for all years, and when containers were listed, they included "packages and boxes", as well as kits and barrels. On the basis of prices, the authors concluded that the per unit weight of pickled salmon shipped in packages was roughly the same as that shipped in barrels; quantities expressed in such terms were therefore treated as if they had, in fact, been packed as 200 lb barrels. Boxes are discussed in the next section.

Home consumption of pickled salmon was reported in barrels at various times from 1881 through 1887 for the Strait of Georgia, Victoria and the Fraser River. These values are lumped with commercial production for this period.

3.2. Cases of Canned Salmon

Shepard and Argue established that the 48-lb case, the industry-wide standard measurement of canned fish production in existence today, was first adopted in 1874. Departmental reports for all succeeding years (except for 1875 for which no data were given) confirm this conclusion. For earlier years, Shepard and Argue reasoned that 100 lb cases each consisted of 100 one-pound tins of salmon, and that references to tons of salmon were in fact to long tons (2,240 lb), each consisting of 22 cases of 100 one-pound tins.

To provide background for assessment of the extent of canned salmon production in 1871, 1872 and 1874, years for which production data were lacking, Shepard and Argue analysed available Customs data. For 1871, some of the exports were listed in terms of "boxes". Although the data are not conclusive, the authors considered that these containers were probably 48-lb cases of canned salmon. The reader is referred to the original paper for further discussion.

From 1876 onward, all canned pack data in official reports are given in either 48-lb cases, pounds or hundredweight (defined in the reports as comprising 100 lb rather than the 112 lb comprising a British hundredweight).

3.3. Numbers and Weight of Fresh and Frozen Fish

As shown in Table D1, quantities of fresh or frozen fish are given in pounds or hundredweight in most years. For 1880, 1881, 1883, 1884 and 1885, however, the data are given in numbers of fish. In order to estimate weights from such data on numbers, it is necessary to know the species composition of the salmon used. As discussed in Appendix E (Section 3.2.3.2), these fish were assumed to be predominately chinook and coho. We used the average round weight of the combined coho and chinook catch for all of British Columbia from 1951 to 1954 which was 10.08 lb, rounded to 10 lb, to convert numbers to weight.

The early Annual Report data sometimes mixed fresh fish used for subsistence purposes with that sold fresh in local or export markets. As shown in Table D2 for 1882 through 1887, the fresh salmon data included salmon variously used by individual commercial fishing establishments, by individuals "for home consumption", and "by hawkers". The Annual Reports also include estimates of consumption of salmon and other fish (lumped) "by Chinese labourers and others on the railway" (for 1883-1887), quantities of fish (species unspecified) "sold in markets" (1877-1886), and fish (again species unspecified) "cured for home or private consumption". It is not certain to what degree the latter two categories included salmon, but there is no doubt that the category listing consumption by railway workers would have contained important numbers of salmon. As shown in Table D3, the estimated value of fish consumed by railway crew was substantial; had all these fish been salmon, the quantity could have exceeded a million pounds a year (e.g. $100,000 worth of fish in 1887 @ .10/lb the prevailing price for fresh fish); these data were not included in our tabulations.

From 1888 onward, such statistics were presented by general areas rather than by establishments and so it is not possible to determine with certainty whether or not salmon used for subsistence purposes were included. For some areas prior to 1888, it would seem that such catches would have been included. For example, from 1883 through 1887 the tables contained a listing for "home consumption or home consumption and exportation" for

Victoria and other places (mainly on Vancouver Island). Entries under this category were very substantial (See Table D2).

During the 1883-1887 period, records of production of fresh fish in commercial establishments on Vancouver Island were limited to listings for establishments only in Victoria (Juan de Fuca Strait) or Alert Bay (Johnstone Strait); no commercial production was listed for the Vancouver Island shore of the Strait of Georgia north of Victoria. Despite this, in the 1888 record (see text Table 23), production in the area between Comox and Victoria (but not including Victoria) was listed as being amongst the highest on the coast. To our knowledge, there was no sudden development of commercial establishments in the latter area between 1887 and 1888. It therefore would seem likely that fresh fish data, which in years prior to 1888 had been listed as, for example, "for home consumption in Victoria and other places", was now included in the 1888 record as commercial production under the heading "from Comox River to Victoria". On this basis, and for purposes of consistency in our analyses, we have included the salmon figures separately for home consumption and personal use listed in the 1882 to 1887 Annual Reports under the headings "Fresh/Frozen" "Fishermen" in main text Tables 23 and 26. The figures for fish utilized by railroad crew, or unspecified fish sold in markets, or unspecified fish cured for home consumption, however, were not included since these included species other than salmon. It is likely, therefore, that the totals used in our report for these early years do not take into account all salmon passing through commercial channels.

From the beginning of the recording of landed weights shortly before World War I through 1950, Government statisticians always assumed that fresh and frozen fish were sold in the round (i.e., the landed weight:processed weight conversion factor was 1.0). We used this factor for landings of fresh and frozen salmon for the entire study period, 1828-1950. This assumed value may not be accurate for landings by hook and line troll fishermen. Although we do not have documentary proof, we believe that the troll fishery landed its product in the dressed form (generally gutted, head on) through much of its history. Also, for most of the pre-1951 period, it is believed that troll-caught chinook and coho salmon were purchased by the pound rather than by the piece. In contrast, at least before 1940 according to Lyons (1969), most fish used for canning and mainly caught by net fishermen were purchased by the fish. She states that 1937 was the first year that sockeye "was bought by the canners on a weight basis at some location". With respect to hook and line caught chinook, in the 1913-1914 DMF Annual Report the Inspector of Fisheries for District II, Edward G. Taylor, reported that after a short strike, buyers paid hand line fishermen fishing around Langara Island between four and five cents per pound for chinook.

Since 1951, DFO divided troll caught landed weights by 0.85 to estimate GLWs. We were unable to find any evidence that departmental officials made corrections for such on-board processing prior to 1951; a view shared by Burton (1949). If they did not, it must be assumed that, for some areas and years prior to 1951, estimates of the landed weight of fresh and frozen salmon (most of which were troll-caught chinook and coho salmon) in the published statistics and in estimates presented in this report could be too low by as much as 15 percent. We have not made any attempt to adjust for such possible errors. In the first place we do not have solid evidence that such errors did occur. In the second place we felt that it was more important to develop a consistent body of product data that could be related in an orderly manner to the published DMF records than to attempt to "fine tune" the product data,

rendering it difficult to identify the figures we develop in this paper with the existing published historical record.

3.4. Values of Smoked Fish

For most years between 1877 and 1885 quantities of smoked salmon were expressed in terms of dollar value (Table D1). In our analyses, these values were converted to product weights on the basis of price. The annual reports for 1878 and 1879 listed a price of 8 cents per lb for smoked product. The data for those years were listed in part by weight and in part by value (the latter for production in the Victoria area). The value data were transformed to weight data on the basis of 8 cents/lb. Data for 1877 were limited to a single value. The 1878/1879 price of 8 cents/lb was used to estimate product weight for that year.

Annual Reports from 1883 onward provide information on both weights and value, permitting computation of prices. As shown in Table D2, the price in 1883 was 14 cents/lb, 6 cents more than in 1879. Lacking any direct information on prices in the intervening years of 1880-1882, the average of the 1879 and 1883 prices (i.e. 11 cents/lb) was used to convert the value data for the former three years into weight data.

Data derived by applying the above price conversions are summarised in Table D2.

The smoked salmon data for the early years are somewhat equivocal in that they list not only production in commercial establishments but also smoked salmon used for "home consumption". For the reasons cited in Section 3.3 above, home consumption data were included in the analyses in the present report. Relevant data for both commercial and home consumption production are listed in Table D2.

3.5. Tierces of Mild Cured Salmon

From 1906 through 1909 production of mild cured salmon was recorded in tierces (Table D1). As outlined by Shepard and Argue (1989), in Hudson's Bay Company days a tierce of pickled salmon appeared to average about two barrels worth of fish (about 360 lb). In later years, however, when mild cured salmon production by non Hudson's Bay entrepreneurs began, tierces were much larger. The Annual Report for 1907 carries the notation that "a tierce is 760 lb". The Reports for 1908 and 1909 indicated that the average weight of a tierce was 750 lb. From 1910 onward, mild cured production was listed in hundredweight and the 1910 Annual Report makes it clear that the hundredweights used were "short" (i.e. 100 lb) rather than "long" (i.e. 112 lb).

Other authors have used different figures to represent the average weight of product in a tierce. Thus, Appendix 37 in Lyons (1969) indicated that tierces were "each of 825 pounds net weight". Issues of the Pacific Fisherman periodical early in the century[3] and Cobb's monograph (Cobb 1921) consistently use a figure of 800 lb/tierce. Both these figures are higher than the figures used in the Department's Annual Reports. Nevertheless, since the purpose of establishing conversion factors is to transform Department measures of the time from existing units, in this case tierce, to pounds, we decided to use the Annual Report

3. Pacific Fisherman. February 1907. Page 63.

measures. On this basis, in 1906 and 1907 a measure of 760 lb/tierce was used, whereas for 1908 and 1909 a measure of 750 lb tierce was adopted. Thereafter, mild cured salmon was expressed in hundredweight in DMF and DBS reports.

3.6. Weights of Other Products

Quantities of other products (e.g. roe or bait) were all given directly in pounds or hundredweights. Since roe was a by-product of processing, roe amounts were not used to calculate landed weight of the catch.

4. PRODUCT/LIVE WEIGHT CONVERSION FACTORS

Having established the net weight of processed salmon products throughout the Province from 1828 to 1950, our next task was to convert these product weights into the weight of freshly landed salmon (GLW) for the years of concern.

Beginning in 1933, the annual Dominion Bureau of Statistics report containing the Fisheries Statistics of Canada provided the conversion factors that were used to calculate estimates of total landed weight. These are summarised for 1933 in Table D4. The factors for smoked, dry-salted, mild cured and pickled products remained unchanged from 1933 through 1950, the year before the modern British Columbia sales slip system came into operation and the last year in which we depended on Dominion Bureau of Statistics data. The factor for canned salmon, however, did change from 84 lb of raw fish per 48 lb case of canned product in 1933, to 80 lb in 1939 and to 75 lb in 1945,[4] reflecting the view that more efficient use was being made of the catch as time went on.

The question remains as to what conversion factors should be used for years prior to 1933.

4.1. Conversion Factors in Use from 1910 to 1932

Examination of various published and unpublished documents of the DMF indicated that the conversion factors listed in 1933 had been in use at least back to 1923. The question was: were the conversion factors used in 1923 to 1950 the same as those used from 1910 to 1922?

From 1910 onward, the Annual Reports of the Dominion Government dealing with fisheries provided estimates of the "actual quantities of fish taken" from Canadian waters, which were in effect the landed weight of the catch (GLW) in each area. Departmental officers obtained the required numbers by applying conversion factors to product and canned pack data obtained from commercial enterprises, and from Fishery Officers' estimates of quantities of products sold directly by fishermen. In order to conduct our analyses we had first to

---

4. In the 1980s, the Department of Fisheries and Oceans used the following conversions for the canned pack: 68 lb for sockeye, 72 lb for chinook, coho and steelhead and 75 lb for pink and chum (Ms. Mary Wiebe, DFO Vancouver, pers. comm.). Based on industry surveys, current (1990s) industry conversion factors are: canned – 68 lb for sockeye, 74 lb for chinook, 71 lb for coho, 76 lb for pink and 75 lb for chum; salted – 1.26 for red chinook and 1.28 for sockeye; smoked – average 1.68 lb, ranging from 1.45 to 2.19 depending on the salmon species and whether the product is cold or hot smoked; and fresh/frozen head-on – average 1.17, ranging from 1.14 to 1.29 depending on the salmon species and whether the product is fresh or frozen (Ms. Carmen Matthews, B.C. Ministry of Agriculture, Food and Fisheries, pers. comm.).

determine the conversion factors used by the officers, and then to determine the species composition of salmon (Appendix E) used for each product.

The following six sections deal with verification that conversion factors for 1933 were the same as those for 1923, and verification that these factors were used to convert products and the canned pack to GLW in 1910 to 1932.

4.1.1. The 1923 worksheet

Departmental statistical files for 1923 to 1950 are relatively complete and worksheets that were used to prepare annual statistical summaries published in the DBS "Fisheries Statistics of Canada" were available to the authors for many of these years. For example, for the 1923 season, statistical officers prepared a table listing the quantities of products processed by each commercial establishment in the Province, plus an estimate of the quantities of fish marketed directly by fishermen on their own. The officers then calculated the total green landed weight of salmon used by each establishment. Table D5 lists extracts from this table with establishment names coded in order to preserve the confidentiality of their operations. Data for three areas, the Skeena River, the Queen Charlotte Islands and District I (the Fraser River) are shown in the table. Column I lists the green landed weight of salmon used by each establishment as computed by the officers. Columns II, IV (numbers of cases), VI and VIII through XIII list the net weight of products put up by each establishment.

Some establishments put up only one type of product. For example, most of the establishments on the Skeena limited their operations to canning. For all establishments limited to canning, it is evident that the officers obtained their estimates of green landed weight by applying a factor of 84 lb/case to the listed numbers of cases canned (Column V = Column I/Column IV). It will be recalled that this is the same conversion factor that was published by DBS in the "Fisheries Statistics of Canada" for 1933. Similarly, there were some establishments that limited their operations to other single products. Thus, for example, establishment "QCI-3" in the Queen Charlotte Islands processed only dry-salted salmon. As in the case of canned salmon, the conversion factor computed by the statistical officer in 1923 for dry-salted product was the same as that published in the 1933 Fisheries Statistics of Canada (i.e. 125-lb raw salmon per cwt. of dry-salted product).

There were a number of establishments that processed several products. With known conversion factors for canned and dry-salted products, it is possible to determine the conversion factors used by the statistical officers for the other products. Thus, for establishment "SK-7", of the total estimated green landed weight of 47,157.17 cwt, 37,403.38 cwt were accounted for by "grossing up" the quantities of canned and salted product by the appropriate conversion factors, leaving 9,754.5 cwt. as the estimated green landed weight of the remaining product of the company - mild cured salmon. This amount is exactly 1.5 times 6,503 cwt mild cured product, indicating that the conversion factor listed in the 1933 Fisheries Statistics of Canada report was also used in 1923. In a similar way, 1923 conversion factors for pickled and smoked salmon were shown to be the same as those used in 1933 (1.5 and 1.7 respectively). The 1923 data indicated that fresh fish and salmon used for bait were

considered to have been marketed in the round (conversion factor 1.0); that the conversion factor for kippered salmon was the same as for smoked (1.7), and because it was considered to be a by-product, the weight of processed salmon roe products were not taken into account in the calculation of green landed weight.

4.1.2. Application of 1933 conversion factors to published 1923 statistics

The validity of these conversion factors was examined by applying them to published statistics on quantities of products processed in 1923. The Bureau of Statistics reports during the period included listings of weights of products by area along with estimates of aggregate green landed weights.[5] Table D6 provides the comparison for 1923. Columns I through VIII list the quantities of each product processed. In columns IX through XVI, the conversion factors developed in the previous paragraph (except for that covering "bait")[6] were applied to the product data from columns I through VIII.

The sum of the estimated green landed weights of products, excluding roe (Column XVII), can be compared with the published Bureau of Statistics estimates listed in Column XVIII. For most areas, the two sets of data were identical or within a few hundredweight of each other. The estimate for the Fraser was out by 938 cwt of a total of 357,407, or less than 0.3%. The estimate for the Skeena was lower by 1,751 cwt of a total of 334,974, or about 0.5%, and for the Big Qualicum to Oyster River area, the published total was 75 cwt (0.6%) lower than the calculated total. These differences could not have arisen simply from the use of different conversion factors; several areas exhibited the same product mixes (fresh and canned fish only) as did the Big Qualicum-Oyster River area and one area (Wreck Bay - San Juan) had the same mix as the Skeena. The computed figures for these other areas exactly matched the published figures. Thus the discrepancy between the figures for these areas and the Skeena River and Big Qualicum to Oyster River areas could not have occurred if the same conversion factors had been used for all areas. It is likely that the relatively minor discrepancies were due either to arithmetic errors, or to last minute adjustments. For example, adjustments to account for late receipt of, or amendments to, product information for these areas; presumable changes were made either to product totals or to green landed weight totals, without consequent changes in other dependent statistics.

Examination of the worksheet data give support to the view that some of the differences are due to arithmetic errors. For example, in the published record for the Skeena, the total quantity of fresh fish was recorded as 37,794 cwt, whereas in the worksheets and the associated forms filled out by companies, the total was 34,794 cwt, a difference of 3,000 cwt. A check of the original forms submitted by fishing companies suggests that the published figures are in error. Apparently in preparing the published table, a transcription error occurred. Correction of this error, however, does not reconcile the Skeena River figures and so it appears likely that other errors had crept in.

---

5. As will be discussed in more detail later in this Appendix and in Appendix F, in the 1920s government statisticians assumed that products processed in each area came from salmon caught in that area.

6. A factor of 2.0 was used for bait because it was noted that the quantities of bait contained in the published material were exactly half those contained in the worksheet. It would appear that the officers had originally used "grossed-up" data instead of unadjusted data and a correction was subsequently made in preparing the published data. For all other years a conversion factor of 1.0 was used for bait.

In light of the foregoing it seems most likely that in 1923 the very small difference between calculated and published figures for green landed weight (which on a province-wide basis amounted to less than 0.15% of the total) was due to arithmetic errors. We conclude that the conversion factors recorded in the 1933 Annual Report probably were applied by government bookkeepers to the 1923 to 1932 data.

4.2. Further Test of the Applicability of Using 1933 Conversion Factors During 1910-1932

As a further test of the validity of the 1933 conversion factors, the calculations in Table D6 were applied to published product and canned pack data in government reports for 1910 (the first year the annual reports give estimates of green landed weight) through 1932. Estimates based on "grossed-up" product data were compared with the published figures for green landed weight for each statistical area and for the province as a whole. The results are summarised in Table D7 for 1910 through 1932.

4.2.1. 1910-1920

Table D7 shows that for 1914, 1915 and 1917, the computed estimates were virtually identical to the published figures, both within statistical areas and for the province as a whole.

For 1916, the provincial totals were almost identical (only a two cwt difference out of a total of almost 1.2 million cwt) but there were significant differences in the figures for three areas (between 1,000 and 3,500 cwt) in northern British Columbia (District II). These differences seem to be due to compensating mistakes in assigning fish to areas, or to genuine attempts to distinguish between areas where fish were caught and landed, as opposed to areas where fish were processed. Unfortunately, files of Departmental correspondence for the pre-1923 era are very sketchy and provide no help in answering this question. In any event, it appears that the discrepancies noted in the 1916 data were not due to use of different conversion factors.

For 1913, estimates were identical with published figures for all but one of 15 statistical areas in use that year. The published figure for Cowichan was over 7,000 cwt greater than the estimate based on grossed-up products. Since the same mix of products occurred in Cowichan and in several other areas, it is evident that the discrepancy was not due to use of different conversion factors than those used in 1933. Thus we conclude that from 1913 to 1917 the conversion factors used to expand product weight data to green landed weights were the same as those in use in 1933.

For the three earlier years, 1910-1912, the estimates and the published totals on an aggregate provincial basis were within one percent. There was, however, almost no agreement between figures on an area by area basis. In one year the estimated figures were higher than the published figures, whereas in the other two years the reverse was true. In a few areas there were only two products processed. Trial calculations suggest that, for some products, somewhat different conversion factors might have been used in these three years. For example, in the Comox area in 1912, products were limited to fresh and smoked salmon. Assuming that the weight of fresh fish was not grossed up (a situation that seems to have been the case until 1951), a conversion factor of 2.0 for smoked salmon (rather than 1.7 as used in 1933) would have been required to arrive at the published total green landed weight for the

Comox area. Application of a factor of 2.0 to smoked salmon in other areas resulted in agreement between estimated and published figures for four of 15 areas where processing was limited to preparation of fresh, smoked and dry-salted (conversion factor 1.25) products. This suggests that the conversion factors for fresh and dry-salted salmon were the same as those used in 1933, but that the factor for smoked salmon was higher. Unfortunately, application of this approach to data for 1910 and 1911 for areas with similar product mixes did not provide similar solutions. Several other modifications to conversion factors were tried to achieve better fits between the grossed-up estimates and the published figures. None, however, provided a consistent solution for all three years. Searches of the very sparse Departmental file material revealed a few references to different conversion factors. Application of some of the factors mentioned in these files did not provide improvements in the fit of the calculated data to the published figures.

After numerous attempts to reconcile the data for the 1910-1912 period, it was concluded that during these early years, the method of recording catch estimates from product data was in a formative state, varying between areas and years. Nevertheless, taking into account the overall good fit of the 1933 conversion factors to the 1910-1912 data (over 99% agreement overall in each of the three years on a province-wide basis), it was concluded that application of the 1933 conversion factors to the 1910-1912 product data would provide a reasonable estimate of green landed weight by area for the 1910-1912 period.

Data for 1918 were very different from those for any other year between 1910 and 1932. On a province-wide basis, the published GLW for total catch was more than 10 percent below the figure based on product weight gross-ups. Attempts to unravel the mystery were unsuccessful. The differences were quite inconsistent. For example, for the Queen Charlotte Islands, product values were given but no figures were entered for green landed weight. The marked divergence from former recording patterns suggests that some radically different approach had been taken to compute landed weight, perhaps one that took into account transfers of raw fish between areas. However, the fact that most of the computed estimates for individual areas were less than the published figures and that the published aggregate total for the province was less than the computed values by more 10 percent, suggest that the differences were due to factors other than transfers. We were unable to explain the inconsistency of the 1918 data with data for the previous eight years. Data for 1919 also contained a number of inexplicable entries (only two of the 16 area estimates agreed with published figures). Nevertheless, the aggregate difference (only 1.46%) was much less than it had been for 1918 (10.2%). Data for 1920 were identical for most areas and the provincial total was less than 0.5 percent different from the published total.

It is worth noting that in 1917, responsibility for publication of official fisheries statistics passed from DMF (then the Fisheries Branch of the Department of the Naval Service) to the Dominion Bureau of Statistics. Although the 1917 Report of the Fisheries Branch stated that:

> *the statistical information* [contained in the Annual Report] *is collected by our fishery officers and checked in this Department, as before*

the inconsistencies in the published statistics for the next two years (1918 and 1919) may have reflected, at least in part, a breakdown in the system during the transition between the two Departments. It is also noted that 1918-1919 marked the end of World War I and it would

seem natural that the conduct of fisheries and reporting thereof would have been a low priority for the Dominion Government.

4.2.2. 1921-1932

For most years between 1921 and 1932 there was generally close agreement between estimates and published figures for individual areas. For some areas, however, there were rather large discrepancies. These appeared to occur at random and could not be explained by use of conversion factors different from those used in 1933. For areas with similar product mixes, estimates and published figures for some were in complete agreement, but differed markedly in others. In the end, we concluded that the discrepancies reflected the influence of factors other than different product weight/live weight multipliers.

In some cases, the differences could have reflected adjustments for transfers of raw product between areas prior to processing. This, however, was not the general practice during the pre-1933 period. Even though it was known that raw material was being moved between areas, particularly during the late 1920s, there was no evidence in the archival material that published statistics took such transfers into account.

During the 1921-1932 period there were only two years (1928 and 1932) when the difference between estimated landed weight and published landed weight for the whole province exceeded 1 percent of the published total (Table D7). In both cases the published landed weights were higher than the computed estimates, suggesting the possibility that the published figures took into account supplementary information such as late returns, and that these were not reflected in the product data.

4.2.3. Summary

We conclude that conversion factors the same as or very close to those contained in published reports starting in 1933 were used by government statisticians throughout the 1910-1932 period in order to convert company records of product data by area to estimates of GLW by area. Therefore, in the main text tables we used our calculated GLWs for 1910-1932. Good correspondence between computed and published totals indicates that the bookkeepers assumed that all salmon products processed in an area came from fish that had been caught and landed in the same area. However, as discussed in Appendix F, the 1920s saw increasing transfers of raw material between areas for processing, which would have significantly weakened the validity of this basic assumption.

4.3. Appropriateness of Using 1933 Conversion Factors Prior to 1910

Prior to 1910, Dominion reports do not provide estimates of green landed weight. As outlined earlier in this appendix, information on quantities of products processed by establishment and area are available from the earliest days of the fishery. In order to use such data to develop estimates of landings, the applicability of conversion factors in use from 1910 onwards to the earlier data was considered.

4.3.1. Canned pack

The principal product in the pre-1910 period was canned salmon. In the earliest days of the fishery, it would not be surprising to find that there had been substantial wastage of raw fish in the canning process, which at the time was carried out on a largely experimental basis. Even in the early days, however, there was an obvious concern for efficiency. Salmon were not easily caught every year and the processors were hard pressed to make an economic go of their businesses. According to Lyons (1969):

> ... *it was said of Alexander Ewen* [the acknowledged leader of the industry in its early years] *that he never wasted a fish.*

By 1890 the industry had matured. In many years the availability of fish was a limiting factor in the total output (e.g., see 1876 DMF Annual Report). Under these circumstances there would have been a premium on full utilisation of all fish landed. A special report included in the Annual Report of the Department of Marine and Fisheries for 1890 provides insight into the extent of utilisation of salmon in the production process of that time. During the 1890 season, Mr. Samuel Wilmot, Superintendent of Fish Culture for the Dominion, visited British Columbia to examine the effectiveness of the Department's program there. With respect to utilisation of salmon in the canneries, Mr. Wilmot noted that:

> ... *the head, shoulders, tail-cut, fins and entrails, making nearly one-third of the whole salmon, is shoved off the table ...*

Wilmot's report continues:

> *The usual weight of the general run of 'Saw-kay' salmon in the Fraser River will average between 7 and 8 pounds. If the fish are very plentiful in the river the canneries give a little more latitude to the slashers who cut off the heads, tails and fins, which they take advantage of by being more generous in the size of the parts they cut off as waste, as it is much easier to do so. In this case an average 8 pound salmon will make from four to four and a-half 1 pound cans for market. If, on the other hand, the fish are not so plentiful, less curtailing of the body of the salmon is done, and four and a-half or five cans may be got from the same sized fish.*

On the basis of Wilmot's observations, in years when salmon were plentiful, between 85 and 96 pounds of raw product would have been required to produce a 48 pound case of canned product. In leaner years, he estimated that with more efficient utilisation, only 77-85 pounds of raw fish would have been required. The median of these observations is about 85 pounds of raw fish per 48-pound case of tinned salmon, a level of utilisation similar to that used in the post-1910 period.

Based on this finding, the authors concluded that for the pre-1910 period, the conversion factor used by the Department up to 1939 (84 lb/case) would be reasonable for use throughout the early years of the industry.

4.3.2. Products

There are virtually no data on the amounts of raw salmon that were used to put up various types of products prior to 1910. However, the technology for processes such as mild curing and dry salting, as applied by the Pacific salmon industry, developed only around the turn of the century (mild cured production was recorded first in 1906 and dry salting only a decade earlier). Thus the use of conversion factors developed around 1910 to data for the decade or two immediately preceding would probably not result in any great degree of distortion. Smoking was a highly traditional form of processing, stemming from Aboriginal and early Hudson's Bay Company practices. It is doubtful if the efficiency of the smoking process would have been greatly different in the pre- and post-1910 periods. To some extent pickling too was a traditional activity, having been initiated on the Pacific coast by the Hudson's Bay Company before 1830. The pickling trade was all but over by 1910 with only sporadic packs being made. Conversion factors developed around 1910, therefore, were probably based largely on the traditional practices that had prevailed for many years before.

4.3.3. Summary

Admittedly, evidence of utilisation (conversion factors) in the pre-1910 period is almost non existent. Nevertheless we believe that, for the products discussed in the previous paragraphs, it is unlikely that the extent of utilisation was much different in the pre- and post 1910 period, at least during the period after the industry had developed to a highly industrialised level in the late 1880s and early 1890s. In earlier years, when competition for fish was less and operations more primitive, it is quite possible that there was more wastage and that conversion factors might have been higher. However, there is little evidence in archival material examined to date to establish quantitative bounds on such numbers, so the authors have chosen to apply the post-1910 conversion factors (Table D8, column 3) throughout the history of the fishery. Doing so may have resulted in underestimation of the catch in the earliest years.

Table D1. Units of measurement for salmon products processed in British Columbia, 1828-1950.[a]

Year	Pickled		Dried	Canned	Fresh	Frozen	Fresh & Frozen	Smoked	Dry Salted	Mild Cure	Roe
	Processed	Exported									
1828, 1829	Tierces, Fish	-	-	-	-	-	-	-	-	-	-
1830, 1831	Barrels	-	-	-	-	-	-	-	-	-	-
1832	N.A.	-	-	-	-	-	-	-	-	-	-
1833, 1834	Barrels & Half barrels	-	-	-	-	-	-	-	-	-	-
1835	Tierces, Barrels,Half Barrels & Hogsheads	-	-	-	-	-	-	-	-	-	-
1836-1841	Barrels	Barrels	-	-	-	-	-	-	-	-	-
!842,1843	N.A.		-	-	-	-	-	-	-	-	-
1844-1851	Barrels	Barrels	-	-	-	-	-	-	-	-	-
1852	Barrels & Half Barrels	Barrels & Half Barrels	-	-	-	-	-	-	-	-	-
1853, 1854	Barrels	Barrels & Half Barrels	-	-	-	-	-	-	-	-	-
1855	N.A.	Barrels	-	-	-	-	-	-	-	-	-
1856	Barrels	Barrels	-	-	-	-	-	-	-	-	-
1857-1859	N.A.	Barrels	-	-	-	-	-	-	-	-	-
1860	Barrels	Barrels	-	-	-	-	-	-	-	-	-
1861	Barrels	Barrels	-	-	-	-	-	-	-	-	-
1862-1866	N.A.	Barrels &	-	-	-	-	-	-	-	-	-
	-	Packages	-	-	-	-	-	-	-	-	-
1867,1868	Barrels	Barrels &	-	-	-	-	-	-	-	-	-
	-	Packages	-	-	-	-	-	-	-	-	-
1869	Barrels	Barrels,Kits	-	-	-	-	-	-	-	-	-
	-	& Packages	-	-	-	-	-	-	-	-	-
1870	Barrels	Barrels &	-	100 lb Cases	-	-	-	-	-	-	-
	-	Packages	-	-	-	-	-	-	-	-	-

This page intentionally left blank.

Table D1. Continued

Year	Pickled		Dried	Canned	Fresh	Frozen	Fresh & Frozen	Smoked	Dry Salted	Mild Cure	Roe
	Processed	Exported									
1871	Barrels	Barrels &	-	NR	-	-	-	-	-	-	-
	-	Boxes	-	-	-	-	-	-	-	-	-
1872	NR	Barrels &	-	NR	-	-	-	-	-	-	-
	-	Packages	-	-	-	-	-	-	-	-	-
1873	Barrels	Barrels	-	Tons &	-	-	-	-	-	-	-
	-	-	-	100 lb Cases	-	-	-	-	-	-	-
1874	Barrels	Barrels	-	48 lb Cases	-	-	-	-	-	-	-
1875	NR	Barrels	-	NR	-	-	-	-	-	-	-
1876	Barrels	Barrels	-	48 lb Cases	-	-	-	-	-	-	-
1877	Barrels	Barrels	-	lb	-	-	-	$	-	-	-
1878	-	-	-	Cans	-	-	-	$ & lb	-	-	-
1879	Barrels &	-	-	lb	lb	-	-	lb	-	-	-
	& Kits	-	-	-	-	-	-	-	-	-	-
1880	Barrels &	-	-	48 lb Cases	No. @ $.50	-	-	$	-	-	-
	& Kits	-	-	-	-	-	-	-	-	-	-
1881	Barrels	-	-	48 lb Cases	No. @ $.25	-	-	$	-	-	-
1882	Barrels	-	-	48 lb Cases	lb	-	-	$	-	-	-
1883,1884	Barrels	-	-	48 lb Cases	No. @ $.30	-	-	$	-	-	-
1885	Barrels	-	-	48 lb Cases	No.	-	-	$	-	-	-
1886-1888	Barrels	-	-	48 lb Cases	lb	-	-	lb	-	-	-
1889-1896	Barrels	-	-	lb	lb	-	-	lb	-	-	-
1897-1899	Barrels	-	-	lb	lb	-	-	lb	lb	-	-
1900	Barrels	-	-	48 lb Cases	lb	-	-	lb	lb	-	lb[b]
1901	Barrels	-	-	48 lb Cases	lb	-	-	lb	lb	-	NR
1902	Barrels	-	-	48 lb Cases	lb	-	-	lb	lb	-	lb[c]
1903	Cases	-	-	48 lb Cases	lb	-	-	lb	lb	-	lb[d]
1904,1905	Barrels	-	-	48 lb Cases	lb	-	-	lb	lb	-	lb[d]
1906-1909	Barrels	-	-	48 lb Cases	lb	lb	-	lb	lb	Tierces	NR
1910	NR	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	NR
1911	NR	-	Cwt	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	Cwt
1912	NR	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	Cwt

Table D1. Continued

Year	Pickled		Dried	Canned	Fresh	Frozen	Fresh & Frozen	Smoked	Dry Salted	Mild Cure	Roe
	Processed	Exported									
1913	NR	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	NR
1914	Cwt	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	NR
1915	Cwt	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	Cwt
1916	NR	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	Cwt
1917-1919	NR	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	Cwt
1920-1950	Cwt	-	-	48 lb Cases	-	-	Cwt	Cwt	Cwt	Cwt	NR

a. Sources:
All Categories 1873-1916 Ann. Rept. Dept. Mar. & Fish. (and successor organizations).
1917-1950 Dominion Bureau of Statistics, Fisheries Statistics of Canada.
Pickled (Processed) 1827-1829 H.B.C. Fort Langley Post Records -See Shepard et al. (1987).
1860 Summary of Fort Langley Post Records in Cullen (1979).
1861 Bluebook for the Colony of British Columbia.
1867-1871 Cullen (1979).
Pickled (Exported) 1860-1870 Bluebooks for the Colony of British Columbia.
1871-1877 Tables of the Trade and navigation of the Dominion of Canada for the Fiscal Years ending 30th June, 1871-1878.
Canned 1870 Lyons (1969).

b. "Salted roe", type of fish not specified, assumed to be mainly salmon.
c. "Salmon roe"
d. "Fish roe", type of fish not specified, assumed to be mainly salmon.
NR no record

Table D2. Information on utilization of fresh and smoked salmon in British Columbia during 1877-1887.

Year	Area	Smoked Salmon						Fresh Salmon			
		Recorded Production		"Home Consumption & Exportation"		Price c/lb	Estimated Production lb	Commercial Markets		Personal Use	
		$	lb	$	lb			lb	No.	lb	No.
1877	Juan de Fuca	$600 [a]	-	-	-	0.08 [b]	7,500	-	-	-	-
1878	Johnstone Strait	-	15,041	-	-	-	15,041	-	-	-	-
	Naas River	-	1,700	-	-	-	1,700	-	-	-	-
	Juan de Fuca	$800 [c]	-	-	-	0.08 [d]	10,000	-	-	-	-
1879	Fraser River	-	7,500	-	-	-	7,500	15,000	-	-	-
	Johnstone Strait	-	15,000	-	-	-	15,000	-	-	-	-
	Juan de Fuca etc.	$750 [e]	-	-	-	0.08 [d]	9,375	-	-	-	-
1880	Juan de Fuca etc.	$950 [e]	-	-	-	0.11 [f]	8,636	-	-	-	-
	Fraser River	-	-	-	-	-	-	-	27,678	-	-
1881	Juan de Fuca etc.	$1,450 [e]	-	-	-	0.11 [f]	13,182	-	-	-	-
	Fraser River		-	-	-	-	-	-	153,800	-	-
1882	Juan de Fuca etc.	$1,500 [e]	-	-	-	0.11 [f]	13,636	-	-	-	-
	Fraser River	$130	-	-	-	0.11 [f]	1,182	59,000	-	53,600	-
1883	Fraser River	$500	-	-	-	0.14 [d]	3,571	-	42,700	-	59,500
	Naas River	$915	-	-	-	0.14 [d]	6,536	-	7,974	-	-
	Strait of Georgia	-	-	$54,500 [g]	-	-	389,286	-	-	-	-
1884 [h]	Fraser River	-	15,000	-	2,000 [i]	-	17,000	-	76,356	-	66,700 [j]
	Strait of Georgia	-	-	-	350,000 [g]	-	350,000	-	-	-	30,000 [g]
1885 [h]	Fraser River	-	10,500	-	3,500	-	14,000	-	92,000	-	77,700 [j]
	Strait of Georgia	-	-	-	356,000 [g]	-	356,000	-	-	-	35,000
1886	Fraser River	-	14,200	-	4,500 [k]	-	18,700	409,450	-	90,000 [k]	-
	Juan de Fuca	-	1,000	-	-	-	1,000	42,000	-	-	-
	Strait of Georgia	-	-	-	3,000 [l]	-	3,000	-	-	50,000 [l]	-
	Skeena River	-	-	-	-	-	-	136,500	-	-	-
	North Coast	-	-	-	-	-	-	3,500	-	-	-
	Rivers/Smith Inlets	-	-	-	-	-	-	52,500	-	-	-
	Johnstone Strait	-	-	-	-	-	-	38,500	-	-	-

Table D2. Continued

Year	Area	Smoked Salmon						Fresh Salmon			
		Recorded Production		"Home Consumption & Exportation"		Price c/lb	Estimated Production lb	Commercial Markets		Personal Use	
		$	lb	$	lb			lb	No.	lb	No.
1887	Fraser River	-	20,600	-	-	-	20,600	1,386,000	-	150,000 [m]	-
		-	-	-	-	-	-	-	-	- [n]	-
	Juan de Fuca	-	8,450	-	-	-	8,450	106,600	-	-	-
	Strait of Georgia	-	-	-	2,000 [o]	-	2,000	-	-	150,000 [o]	-
	Naas River	-	-	-	-	-	-	55,000	-	-	-
	Skeena River	-	-	-	-	-	-	210,000	-	-	-
	North Coast	-	-	-	-	-	-	5,000	-	-	-
	Rivers & Smith Inlet	-	-	-	-	-	-	81,000	-	-	-
	Johnstone Strait	-	-	-	-	-	-	25,000	-	-	-
	West Coast Vancouver Is		-	-	-	-	-	3,000	-	-	-

Footnote quotations are from relevant Ann. Rept. Dept. Mar. Fish. - See Text.

a. "In Victoria and Esquimault " by "Mr. Ingwell and others"
b. Based on 1878-1879 price - See Text.
c. "Per steamers in ice to San Francisco" by " Several parties"
d. Figures published in Annual Reports - See text.
e. By "Various parties in Victoria, Esquimault and other places"
f. Average of 1879 and 1883 prices - See text
g. "Residents of Victoria and Nanaimo and the Coast of British Columbia, for home consumption and exportation" (quote for 1883, wording for 1884 and 1885 differed slighly)
h. Note: The headings for smoked salmon in the Tables in the 1884 and 1885 Annual Reports erroneously indicate dollar values; the headings should indicate pounds.
i. "Residents above New Westminster, for home consumption"
j. "Residents above New Westminster ... and above Burrard Inlet, for home consumption"
k. "Residents along Fraser River and tributaries, including New Westminster ... at Vancouver and Port Moody and neighbourhood of Burrard Inlet for home consumption (estimate)"
l. "Residents at Victoria, Nanaimo and on the coast of Vancouver island, for home consumption (estimate)"
m "Consumption by residents on the Fraser River and tributaries not otherwise mentioned (estimated)"
n. "Fish sold by hawkers at Vancouver, Moodyville and Port Moody (estimated)"
o. "Fish sold by hawkers at Victoria, Nanaimo, Cowichan, Comox, Alberni, and other placed on Vancouver, and on islands in the Strait (estimated)"

Table D3. Value (in dollars) of fish listed as being "sold in markets", "cured for home consumption or "consumed by railroad labourers". From Ann. Rept. Dept. Mar. Fish., 1877-1887.

Year	Sold in Markets	Home Cured	Railway Crew Consumption
1877	32,000		
1878	30,000	2,000	
1879	35,000	2,000	
1880	35,000	2,000	
1881	45,000	2,500	
1882	55,000	3,000	
1883	105,000	6,000	48,000
1884	110,000	8,000	60,000
1885	120,000 [a]		62,000
1886	125,000		70,000
1887			100,000

a. "... not including New Westminster".

Table D4. Product weight/live weight conversion factors used in preparation of the 1933 report on the Fisheries Statistics of Canada.

Product	Factor (lb raw/lb product)
Pickled (wet salted)	1.5
Dry salted	1.25
Mild cured	1.5
Fresh/frozen	1.0
Bait	1.0
Smoked	1.7
Canned [a]	84.0

a. lb raw (round weight)/case

Table D5. Extracts from worksheets used to prepare the 1923 report on Fisheries Statistics of Canada. Salmon data for the Skeena River, Queen Charlotte Islands and Fraser River areas. Establishments given coded names to maintain confidentiality.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
Establishment	**Caught and Landed (cwt)**	**Used Fresh (cwt)**	**I/II**	**Canned (cases)**	**I/IV (X100)**	**Dry Salted (cwt)**	**I/VI**	**Mild Cure (cwt)**	**Pickled (cwt)**	**Bait (cwt)**	**Smoked (cwt)**	**Roe (cwt)**	**Kippered (cwt)**
SKEENA													
SK-1	8,542.80	-	-	10,170	84.00	-	-	-	-	-	-	-	-
SK-2	31,767.12	-	-	37,818	84.00	-	-	-	-	-	-	-	-
SK-3	16,065.28	-	-	18,917	-	140	-	-	-	-	-	-	-
SK-4	33,504.24	-	-	39,886	84.00	-	-	-	-	-	-	-	-
SK-5	29,466.36	-	-	35,079	84.00	-	-	-	-	-	-	-	-
SK-6	15,208.20	-	-	18,105	84.00	-	-	-	-	-	-	-	-
SK-7	47,157.88	-	-	44,007	-	350	-	6,503	-	-	-	-	-
SK-8	17,290.92	-	-	20,138	-	300	-	-	-	-	-	-	-
SK-9	16,355.64	-	-	19,471	84.00	-	-	-	-	-	-	-	-
SK-10	13,630.68	-	-	16,227	84.00	-	-	-	-	-	-	-	-
SK-11	25,769.52	-	-	30,678	84.00	-	-	-	-	-	-	-	-
SK-12	12,304.32	-	-	14,648	84.00	-	-	-	-	-	-	-	-
SK-13	28,323.96	-	-	33,719	84.00	-	-	-	-	-	-	-	-
SK-14	31,199.00	31,121	1.00	-	-	-	-	-	-	78	-	-	-
SUBTOTAL	326,585.92	31,121	-	338,863	-	790	-	6,503	-	78	-	-	-
Schedule II	16,423.00	3,673	-	-	-	-	-	-	-	-	7,500	-	-
TOTAL	343,008.92	34,794	-	338,863	-	790	-	6,503	-	78	7,500	-	-
QUEEN CHARLOTTE ISLANDS													
QCI-1	19,410.76	-	-	17,364	-	3,860	-	-	-	-	-	-	-
QCI-2	9,348.36	-	-	11,129	84.00		-	-	-	-	-	-	-
QCI-3	7,645.00	-	-	-	-	6,116	1.25	-	-	-	-	-	-
QCI-4	2,800.00	-	-	-	-	2,240	1.25	-	-	-	-	-	-
QCI-5	4,500.00	-	-	-	-	3,600	1.25	-	-	-	-	-	-
SUBTOTAL	43,704.12	-	-	28,493	-	15,816	-	-	-	-	-	-	-
Schedule II	680.00	-	-	-	-	-	-	-	-	-	400	-	-
TOTAL	44,384.12	-	-	28,493	-	15,816	-	-	-	-	400	-	-

Table D5. Continued

Establishment	I Caught and Landed (cwt)	II Used Fresh (cwt)	III I/II	IV Canned (cases)	V I/IV (X100)	VI Dry Salted (cwt)	VII I/VI	VIII Mild Cure (cwt)	IX Pickled (cwt)	X Bait (cwt)	XI Smoked (cwt)	XII Roe (cwt)	XIII Kippered (cwt)	
DISTRICT I														
FR-1	10,127.88	-	-	12,057	84.00	-	-	-	-	-	-	-	-	
FR-2	8,896.44	-	-	10,591	84.00	-	-	-	-	-	-	-	-	
FR-3	28,350.92	-	-	32,263	-	1,000	-	-	-	-	-	-	-	
FR-4	6,446.60	2,045	-	5,240	-	-	-	-	-	-	-	-	-	
FR-5	9,749.88	-	-	11,607	84.00	-	-	-	-	-	-	-	-	
FR-6	3,625.44	-	-	4,316	84.00	-	-	-	-	-	-	-	-	
FR-7	9,507.96	-	-	11,319	84.00	-	-	-	-	-	-	-	-	
FR-8	10,447.08	-	-	12,437	84.00	-	-	-	-	-	-	-	-	
FR-9	12,224.52	-	-	14,553	84.00	-	-	-	-	-	-	-	-	
FR-10	32,507.36	-	-	35,604	-	2,080	-	-	-	-	-	-	-	
FR-11	63,468.72	-	-	75,558	84.00	-	-	-	-	-	-	-	-	
FR-12	6,200.00	-	-	-	-	4,960	1.25	-	-	-	-	199	-	
FR-13	3,075.00	-	-	-	-	2,460	1.25	-	-	-	-	-	-	
FR-14	2,100.00	-	-	-	-	1,680	1.25	-	-	-	-	-	-	
FR-15	2,465.00	-	-	-	-	1,972	1.25	-	-	-	-	60	-	
FR-16	2,800.00	-	-	-	-	2,240	1.25	-	-	-	-	-	-	
FR-17	7,100.00	-	-	-	-	5,680	1.25	-	-	-	-	-	-	
FR-18	3,625.00	-	-	-	-	2,900	1.25	-	-	-	-	100	-	
FR-19	1,875.00	-	-	-	-	1,500	1.25	-	-	-	-	-	-	
FR-20	6,095.00	-	-	-	-	4,844		-	-	40	-	240	-	
FR-21	4,812.50	-	-	-	-	3,850	1.25	-	-	-	-	-	-	
FR-22	2,400.00	-	-	-	-	1,920	1.25	-	-	-	-	1,000	-	
FR-23	4,345.00	-	-	-	-	3,476	1.25	-	-	-	-	-	-	
FR-24	2,000.00	-	-	-	-	1,600	1.25	-	-	-	-	-	-	
FR-25	300.00	-	-	-	-	240	1.25	-	-	-	-	-	-	
FR-26	58,794.80	52,854	-	-	-	-	-	3,735	-	-	45	-		154

Table D5. Continued

Establishment	I Caught and Landed (cwt)	II Used Fresh (cwt)	III I/II	IV Canned (cases)	V I/IV (X100)	VI Dry Salted (cwt)	VII I/VI	VIII Mild Cure (cwt)	IX Pickled (cwt)	X Bait (cwt)	XI Smoked (cwt)	XII Roe (cwt)	XIII Kippered (cwt)
DISTRICT I (Continued)													
FR-27	2,015.00	1,565	-	-	-	-	-	300	-	-	-	-	-
FR-28	609.00	609	-	-	-	-	-	-	-	-	-	-	-
FR-29	1,756.00	1,756	-	-	-	-	-	-	-	-	-	-	-
FR-30	34.00	-	-	-	-	-	-	-	-	-	20	-	-
FR-31	480.00	-	-	-	-	-	-	150	170	-	-	-	-
SUBTOTAL	308,234.10	58,829	-	225,545	-	42,402	-	4,185	170	40	65	1,599	-
Schedule II	61,984.00	61,984	-	-	-	-	-	-	-	-	-	-	-
TOTAL	370,218.10	120,813	-	225,545	-	42,402	-	4,185	170	40	65	1,599	-

Table D6. Application of assumed landed weight/product weight conversion factors to published product weight data for 1923 and comparison of results with published figures on green landed weights by area for 1923.

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
	Product Quantity								Estimated Green Landed Weight (GLW)								Est. Total GLW	1923 Ann. Rept.	Diff.
Area	Wet Salt	Dry Salt	Mild Cured	Smoked	Fresh	Canned	Bait	Roe	Wet Salt	Dry Salt	Mild Cured	Smoked	Fresh	Canned	Bait	Roe	Sum Col. IX-XVI		XVII - XVIII
									I X 1.5	II X 1.25	III X 1.5	IV X 1.7	V X 1.0	VI X 0.84	VII X 2.0	VIII X 1.0			
	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cases)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)	(cwt)
FRA	170	42,402	4,185	279	108,002	224,637	20	1,599	255	53,003	6,278	474	108,002	188,695	40	1,599	358,345	357,407	938
SKR	-	790	6,503	-	37,794	338,863	39	-	-	988	9,755	-	37,794	284,645	78	-	333,259	334,974	(1,715)
RIS	-	1,400	-	-	-	127,774	-	-	-	1,750	-	-	-	107,330	-	-	109,080	109,080	-
NAS	-	-	-	-	-	99,580	-	-	-	-	-	-	-	83,647	-	-	83,647	83,647	-
BEK	-	-	1,256	-	-	46,319	-	-	-	-	1,884	-	-	38,908	-	-	40,792	40,792	-
ADL	-	2,340	1,062	-	3,984	234,774	804	-	-	2,925	1,593	-	3,984	197,210	1,608	20	207,320	207,320	-
QCI	-	15,816	-	-	-	28,493	-	-	-	19,770	-	-	-	23,934	-	-	43,704	43,701	3
CAT	226	-	-	-	5,685	-	-	-	339	-	-	-	5,685	-	-	-	6,024	6,024	-
TAP	336	-	1,618	-	7,200	34,233	-	-	504	-	2,427	-	7,200	28,756	-	-	38,887	38,887	-
WRS	-	28,990	-	-	38,165	47,757	1,532	-	-	36,238	-	-	38,165	40,116	3,064	-	117,582	117,582	-
SCR	-	-	-	94	1,310	29,045	-	-	-	-	-	160	1,310	24,398	-	-	25,868	25,868	-
CRQ	-	-	-	-	1,435	27,486	-	-	-	-	-	-	1,435	23,088	-	-	24,523	24,523	-
BQO	-	-	-	-	320	14,364	-	-	-	-	-	-	320	12,066	-	-	12,386	12,311	75
OYA	-	-	-	-	8,091	22,253	-	-	-	-	-	-	8,091	18,693	-	-	26,784	26,784	-
ARC	-	6,088	-	-	7,630	66,099	5	-	-	7,610	-	-	7,630	55,523	10	-	70,773	70,778	(5)
BUG	-	5,290	-	-	8,471	-	-	-	-	6,613	-	-	8,471	-	-	-	15,084	15,084	(1)
OTAL																	1,514,057	1,514,762	(705)

Key to Areas: FRA: Dist. I (Fraser River). SKR: Skeena River. RIS: Rivers & Smith Inlets. NAS: Naas River. BEK: Bella Coola & Kimsquit. ADL: Addenbrooke Is. to Lowe Inlet. QCI: Queen Charlotte Is. CAT: Cape Scott to Tatchu Pt. TAP: Tatchu Pt. to Wreck Bay. WRS: Wreck Bay to San Juan Hbr. SCR: San Juan Hbr. to Crofton. CRQ: Crofton to Big Qualicum River. BQO: Big Qualicum River to Oyster River. OYA: Oyster River to Adams River. ARC: Adams River to Cape Scott. BUG: Bute Inlet to Gower Pt.

Table D7. Comparison of computed and published estimates of green landed weight for salmon caught in British Columbia during 1910-1932.

Year	Number of Stat. Areas		Published Total Catch (cwt)	Computed Total Catch (cwt)	Difference[a]	
	Total	Number Where Data Agreed			cwt	Percentage
1910	15	0	937,827	930,285	7,542	0.81
1911	15	3	1,103,666	1,124,212	(20,546)	(1.83) [b]
1912	15	7	1,221,056	1,219,336	1,720	0.14
1913	15	14	1,509,354	1,502,053	7,301	0.49
1914	15	15	1,369,740	1,369,742	(2)	(0.00)
1915	16	16	1,366,465	1,366,468	(3)	(0.00)
1916	17	14	1,196,432	1,196,434	(2)	(0.00)
1917	17	17	1,601,520	1,601,519	1	0.00
1918	16	0	1,493,502	1,646,042	(152,540)	(9.27)
1919	16	2	1,668,353	1,644,040	24,313	1.48
1920	16	13	1,262,864	1,256,924	5,940	0.47
1921	17	13	842,026	841,992	34	0.00
1922	17	10	1,509,075	1,505,607	3,468	0.23
1923	16	13	1,514,765	1,512,459	2,306	0.15
1924	16	12	1,965,159	1,965,881	(722)	(0.04)
1925	16	11	1,873,376	1,863,889	9,487	0.51
1926	16	11	2,125,555	2,124,635	920	0.04
1927	13	16	1,490,395	1,489,900	495	0.03
1928	33	26	2,257,455	2,224,924	32,531	1.46
1929	34	28	1,514,038	1,512,562	1,476	0.10
1930	23	16	2,296,213	2,303,259	(7,046)	(0.31)
1931	22	20	1,287,041	1,288,569	(1,528)	(0.12)
1932	23	20	1,291,487	1,270,114	21,373	1.68

a. Bracket indicates negative difference.
b. Conversion factor for dried fish assumed to be 1.5.

Table D8. Summary of product weights and factors used to convert canned packs and products to green landed weight (GLW).

Product	Original Unit (Product Weight)	Conversion Factor	Equivalent GLW (lb)	Equivalent GLW (kg)
Canned	Box, 1871 (48 lb)	1.75	84	38.10
	Case, before 1874 (100 lb)	1.75	175	79.38
	Case, 1874-1938 (48 lb)	1.75	84	38.10
	Case, 1939-1944 (48 lb)	1.67	80	36.29
	Case, since 1944 (48 lb)	1.56	75	34.02
Pickled	HBC Hogshead, 1835 only (250 lb)	1.50	375	170.10
	HBC Tierce, 1828-1835 (360 lb)	1.50	540	244.94
	HBC Barrel, 1830-1871 (180 lb)	1.50	270	122.47
	DMF Barrel, 1861 onward (200 lb)	1.50	300	136.08
	DMF Package (200 lb)	1.50	300	136.08
	DMF 1/2 Barrel (100 lb)	1.50	150	68.04
	DMF kit (50 lb)	1.50	75	34.02
	DMF Pound	1.50	1.5	0.6804
Mild Cured	Tierce, 1906-1907 (750 lb)	1.50	1125	510.29
	Tierce, 1908-1909 (760 lb)	1.50	1140	517.09
	Tierce, since 1909 (800 lb)	1.50	1200	544.31
	Pound	1.50	1.5	0.6804
Dry Salted	Pound	1.25	1.25	0.5670
Smoked	Pound	1.70	1.7	0.7711
Fresh/Frozen	Pound	1.00	1.0	0.4536
Bait	Pound	1.00	1.0	0.4536