STATISTICAL REVIEW OF THE ALASKA SALMON FISHERIES. PART II: CHIGNIK TO RESURRECTION BAY[1]

By

WILLIS H. RICH, Ph. D., *In Charge, Pacific Fishery Investigations*

and

EDWARD M. BALL, *Assistant, Alaska Service*

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INTRODUCTION

In the first paper of this series [2] a general account was given of the sources and nature of the data dealt with and of the methods used. These statements are equally applicable to the data presented in this report, but it has not been thought necessary to repeat them here. The general plan has been followed of considering the various districts in their geographical order from west to east and the more important localities are shown on the accompanying maps, Figures 1 and 9. Minor localities not shown on the maps will be described in the appropriate places. In order to make uniform the review as a whole there has been given only the data up to and including 1927, the last year treated in Part I. Data for 1928 and 1929 are available for the localities treated in this report, but have not been included since it is planned to bring the entire series up to date at approximately 5-year intervals. The authors will be grateful for information as to errors that may be discovered in any of these reports or for additional facts that will aid in interpreting the data.

[1] Submitted for publication June 13, 1930.

[2] Statistical Review of the Alaska Salmon Fisheries. Part I: Bristol Bay and the Alaska Peninsula, by Willis H. Rich and Edward M. Ball. Bulletin, U. S. Bureau of Fisheries, Vol. XLIV, 1928, pp. 41-95, 20 figs., Washington, 1928. Bureau of Fisheries Document No. 1041.

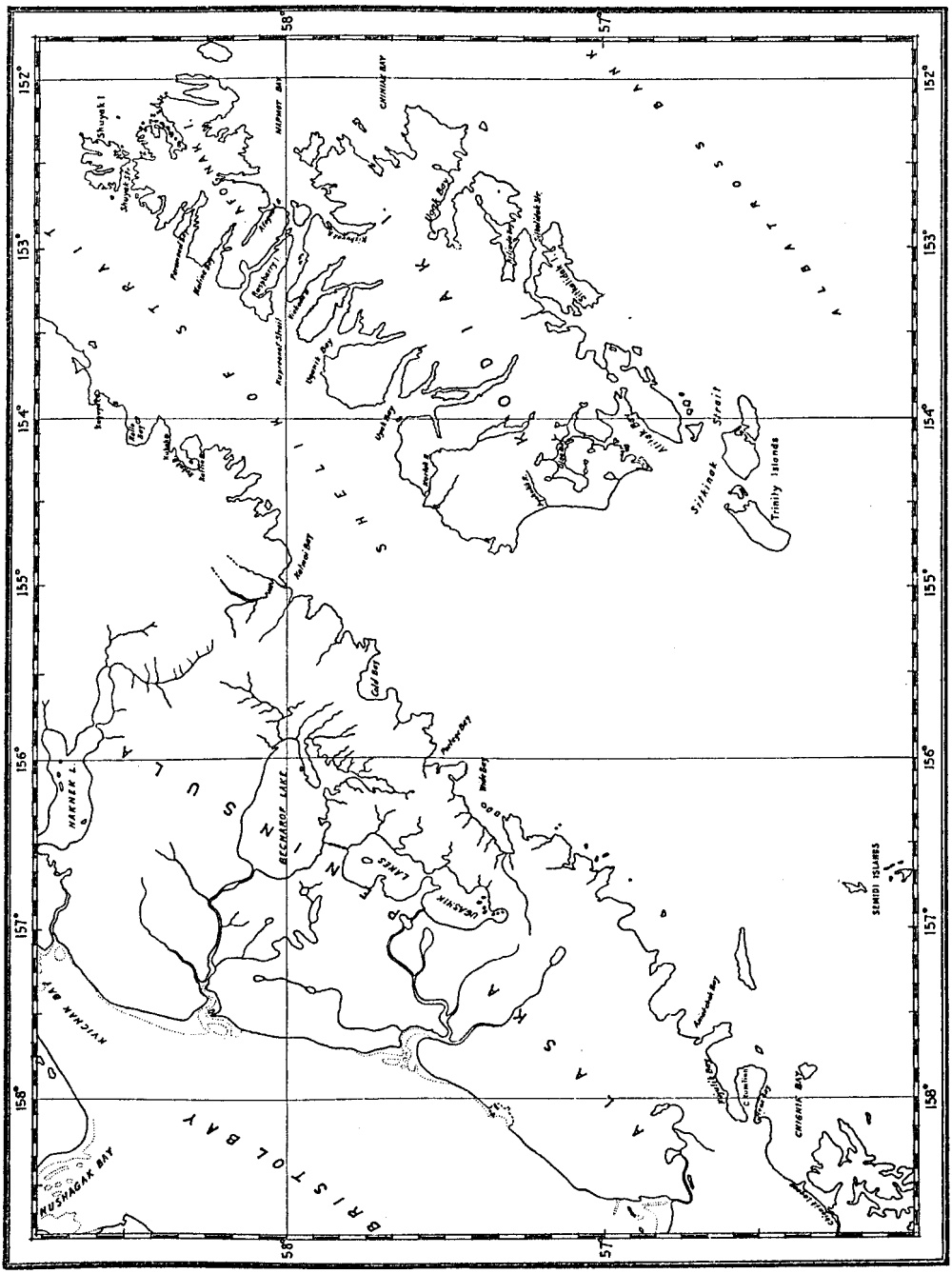

FIGURE 1.—Map of eastern end of the Alaska Peninsula and the Kodiak group of islands

CHIGNIK

The salmon fishery at Chignik began in 1888 when 2,160 barrels of salted salmon were packed. In 1889 canning operations were begun and have been continued without interruption to the present time. A few fish have been salted at various times but the bulk of the catch has been canned. The fishery has been restricted to a relatively small area within a few miles of the mouth of Chignik River and draws mainly upon the runs of salmon which spawn in this stream. As a result, the fishery has been very intense, and the competition between the several operating companies was keen. After various changes in the companies the situation finally became stabilized in 1914 when the three companies then operating—the Alaska Packers Association, the Columbia River Packers Association, and the Northwestern Fisheries Co.—agreed to an equal division of the catch. This resulted in a much more efficient conduct of the fishery, although its intensity and the drain upon the runs was to no extent reduced. There has been no material change in the fishery since that time except as effected by the regulations imposed under the authority given in 1922 by the Executive order establishing the Alaska Peninsula Fisheries Reservation and the act of June 6, 1924. (See Part I, pp. 51 and 52.)

No regulations of consequence were imposed in 1922. In this year, however, a counting weir was established in the Chignik River for the purpose of ascertaining the number of salmon that escaped from the commercial fishery and passed on to the spawning grounds. This weir has since played an important part in the control of the fishery, as will be seen. In 1922 the escapement was 428,976 red salmon, 58,300 cohos, and 241 kings. Pinks and chums were not counted, but the escapement was estimated at 15,000 and 1,200 respectively. The commercial catch of red salmon in 1922 consisted of 1,403,701 fish, 76.6 per cent of the total run. In 1923 the catch and the escapement were both so low that commercial fishing was stopped on August 21, but in spite of this the catch was again in excess of 75 per cent of the total run. The act of June 6, 1924, specifically required an escapement of not less than 50 per cent of the run "in streams where counting weirs are maintained," and this has materially affected the commercial fishery. Furthermore, beginning with 1925 it has been required that the minimum escapement shall be not less than 1,000,000 and this requirement has been practically met in each subsequent year. These regulations have had a marked effect upon the catch, and it will be necessary to bear them in mind in order to interpret properly the fluctuations in the catch that appear in the table.

In the earlier years, the fishery at Chignik was confined exclusively to Chignik Bay and Chignik Lagoon. In 1913 a small catch was made in Hook Bay, and in 1917 operations were extended to include Aniakchak and Kujulik Bays (fig. 1). The catch in these three minor districts has been largely composed of pinks, chums, and cohos, and this extension of the Chignik fishery was interrupted in 1921 owing to the depressed market for the cheaper grades of canned salmon. (See p. 43, Part I.) It was resumed again in 1924 and has continued to the present time.

The figures for the salmon catch at Chignik are given in Table 1. The data for the years 1888 to 1904, inclusive, have been adapted from Moser [3] and from the various reports of the Treasury agents on the salmon fisheries of Alaska for the years 1892 to 1904.[4]

[3] The Salmon and Salmon Fisheries of Alaska, by Jefferson F. Moser. Bulletin, U. S. Fish Commission, Vol. XVIII, 1898 (1899), pp. 1–178, Washington.

Alaska Salmon Investigations in 1900 and 1901, by Jefferson F. Moser. Bulletin, U. S. Fish Commission, Vol. XXI, 1901 (1902), pp. 173–398, Washington.

[4] These reports appeared regularly, except for 1893, during the interval covered and were published as Treasury Department, Senate and House Documents. The one for the year 1892 was by Max Pracht; those for 1894 and 1895 by Joseph Murray; that for 1896 by George R. Tingle, and those for the years 1894 to 1904, inclusive, by Howard M. Kutchin.

TABLE 1.—*Salmon catch and fishing apparatus used in the Chignik Bay district, 1888 to 1927*

Year	Coho	Chum	Pink	King	Red	Traps
Aniakchak Bay:						
1917	405	19,521	1,948	100	30,162	
1918	2,017	41,903	142,568	216	48,299	
1919	10,492	27,990	1,265		16,181	
1920	1,065	4,099	39,903		3,550	
1924	2,855	4,205	122,926		[1] 17,641	
1925	10,055	11,900	20,954		10,977	
1926	19,097	77,183	275,960	44	67,530	
1927	11,416	27,025	33,070	103	21,459	
Chignik Bay and Lagoon:						
1888					13,000	
1889					560,000	
1890					453,000	
1891					775,000	
1892					522,000	
1893	64,000				600,000	
1894					600,000	
1895					683,319	
1896	56,764			3,304	850,000	
1897	10,510		5,800		765,000	
1898	790	850			1,165,419	
1899	12,882		[2] 18,134		903,749	
1900	2,053	1,200	[3] 52,350		1,047,371	
1901	6,510		40,484		907,350	
1902					1,782,015	
1903	8,616		84,097		1,149,990	
1904			27,785	129	1,689,642	
1905					1,297,114	
1906					1,323,584	
1907	800				1,622,987	
1908					1,630,677	
1909					1,730,804	
1910	36,907		17,170		1,314,672	
1911	7,788	14,788	23,128		1,077,595	
1912	18,979	14,032	55,099	33	1,330,832	
1913	23,773	84,341	29,488	1,918	825,766	
1914	34,475	32,388	80,080	320	1,056,629	
1915	29,617	65,350	55,665	1,054	1,330,031	
1916	45,899	88,778	267,148	1,693	1,002,911	
1917	12,769	54,384	5,603	715	1,425,552	
1918	19,101	233,782	188,293	1,233	1,494,408	
1919	24,439	70,008	3,542	597	868,757	
1920	21,428	141,590	248,257	811	1,769,160	
1921	13,251	220,721	30,620	399	1,828,857	
1922	14,952	212,789	359,510	500	1,248,763*	
1923	18,574	84,375	8,967	867	642,872	
1924	91,330	94,915	638,947	477	856,389	
1925	18,027	69,127	13,453	1,297	693,786	
1926	10,688	103,503	234,571	534	415,214	
1927	85,512	108,185	145,472	813	432,346	
Hook Bay:						
1913		6,811	592		7,454	
1924	248	8,673	238,119	6	3,313	
1925	1,967	14,298	7,297	178	7,833	
1926	2,057	20,181	125,848	252	26,599	
1927	4,468	19,888	6,933	70	1,795	
Kujulik Bay:						
1917	149	34,045	2,032	89	752	
1918		31,033	13,609			
1919		26,965				
1920		6,517	9,666			
1924		3,000				
1925		6,796			62	
1926		64,301	40,647		1,375	
1927	26	16,369	1,235	1	663	
Total:						
1888					13,000	
1889					560,000	
1890					453,000	
1891					775,000	
1892					522,000	
1893	64,000				600,000	
1894					600,000	
1895					683,319	
1896	56,764			3,304	850,000	
1897	10,510		5,800		765,000	
1898	790	850			1,165,419	
1899	12,882		[2] 18,134		903,749	
1900	2,053	1,200	[3] 52,350		1,047,371	23
1901	6,510		40,484		907,350	21
1902					1,782,015	21
1903	8,616		84,097		1,149,990	29
1904			27,785	129	1,689,642	28
1905					1,297,114	12
1906					1,323,584	7
1907	800				1,622,987	8

[1] 10,000 allocated arbitrarily from a catch of 40,294 recorded only as from Chignik Bay and Aniakchak Bay.
[2] Recorded by Kutchin but not by Moser.
[3] Mixed pinks and chums according to Moser.

TABLE 1.—*Salmon catch and fishing apparatus used in the Chignik Bay district, 1888 to 1927*—Con.

Year	Coho	Chum	Pink	King	Red	Traps
Total—Continued.						
1908	----------	----------	----------	----------	1,630,677	8
1909	----------	----------	----------	----------	1,730,804	8
1910	36,907	----------	17,170	----------	1,314,672	18
1911	7,788	14,788	23,128	----------	1,077,595	29
1912	18,979	14,032	55,099	33	1,330,832	37
1913	23,773	91,152	30,080	1,918	833,220	37
1914	34,475	32,388	80,080	320	1,056,629	9
1915	29,617	65,350	55,665	1,054	1,330,031	9
1916	45,899	88,778	267,148	1,693	1,002,911	9
1917	13,323	107,950	9,583	904	1,456,466	12
1918	21,118	306,718	344,470	1,449	1,542,707	12
1919	34,931	124,963	4,807	597	884,938	14
1920	22,493	152,206	297,826	811	1,772,710	12
1921	13,251	220,721	30,620	399	1,828,857	9
1922	14,952	212,789	359,510	500	1,248,763	9
1923	18,574	84,375	8,967	867	642,872	9
1924	94,433	110,793	999,992	483	877,343	9
1925	30,049	102,121	42,704	1,475	712,658	9
1926	31,842	265,168	677,026	830	510,718	10
1927	101,422	171,467	186,710	987	456,263	10

NOTE.—No catches were reported in the years not shown. Kujulik Bay is locally known as Sitkum Bay.

Moser's figures for the years up to and including 1897 give only total case packs and are not segregated by species. The data for 1898 to 1900 give the pack by species and also the average number of fish per case, so that it is possible to estimate the catch with a fair degree of accuracy. The reports of the Treasury agents have also been consulted and the data compared carefully with those given by Moser. These reports show the number of fish caught, and these data have been used when they checked with Moser's figures for the pack. In cases where the two series of data did not check we have assumed Moser's to be the more reliable and have calculated the catch from the pack. The data for the later years, beginning with 1904, have come from the sworn statements submitted yearly to the Bureau of Fisheries by the several companies.

The transfer of fish from one locality to another was a common practice in western Alaska until recently, when it was stopped by regulation. Such transfers were frequently made back and forth between the Chignik canneries and those at Karluk and Alitak and have occasioned a great deal of confusion in the records. Great care has been taken in trying to eliminate errors from this cause and it is believed that the data are fairly well segregated. It is possible, however, that there is still some slight confusion. Another difficulty has been encountered in some of the more recent records due to the agreement between the three companies operating at Chignik to divide the catch equally. The statements submitted by these companies do not always agree; some of the statements are apparently based on the catch made by the particular company regardless of its final disposition, others show the catch and also the deliveries and receipts to and from other companies, and still others show the fish packed regardless of the source. If the procedure has been uniform, any one of the systems would have provided us with the desired data but, unfortunately, this was not the case. The chief difficulty encountered has to do with the allocation of the catch to the several subdistricts, Chignik proper, Aniakchak, Kujulik, and Hook Bays. The statements of the several companies have been very carefully examined and some additional information has been secured by correspondence. In spite of the greatest care it has been necessarry to allocate certain catches arbitrarily, but it is felt that no serious errors have resulted. The totals for the whole district are considered sufficiently reliable for the practical purposes to which they may be put.

RED SALMON

The red salmon of this district are derived almost exclusively from the Chignik River. It is possible that a few fish, especially of those caught in Aniakchak Bay, come from smaller streams near by, but the Chignik runs dominate so largely that we have considered the total catch of the district as a unit and refer it exclusively to the Chignik River. Figure 2 shows graphically the total annual catches of red salmon. It will be seen that the fishery shows much the same history as some of the districts discussed in Part I; namely, a period of gradual growth to a maximum

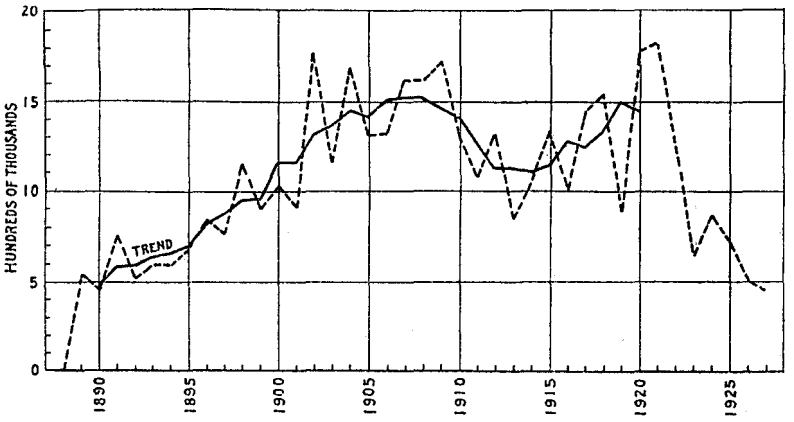

FIGURE 2.—Catch of red salmon at Chignik

which is maintained for a time but is eventually followed by a drop in productivity and the incidence of wider fluctuations which are indicative of depletion. The lowered level of productivity since 1924 is due in part to the regulations which have required an increased escapement as measured by the weir count. Such an increased escapement was necessary to prevent further depletion and to provide for the upbuilding of the run to the level of greatest productivity, but it has, necessarily, decreased the commercial catch. As the runs build up to a more healthy state the

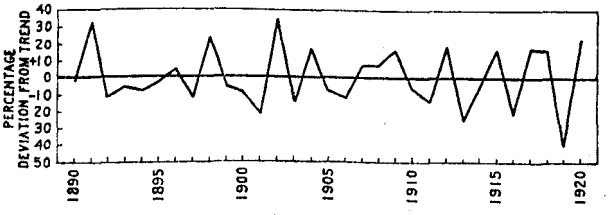

FIGURE 3.—Percentage fluctuation from the trend of the catch of red salmon at Chignik

commercial catch will naturally increase again, and it may be presumed that, as conditions warrant, some of the present restrictions can be gradually removed.

It is interesting to note the character of the deviations from the trend shown by the Chignik catches. The trend shown in Figure 2 has been calculated in the same way as the trends in the previous report and represents a moving average by fives. (See p. 61, Part I.) Figure 3 shows the percentage deviations from this trend. A comparison with the similar graphs (showing the percentage deviations from the trends

in Bristol Bay, p. 63, Part I) shows, in the case of Chignik, a complete lack of the definite periodicity of fluctuations that is such a conspicuous feature in the other districts. At Chignik the fluctuations about the trend are much less violent (the greatest is 41 per cent), and the maxima and minima come at very irregular intervals. It would be difficult to explain this condition were it not for the fortunate fact that recently secured data show that the Chignik red-salmon runs do not consist so predominantly of fish of a single age group. Harlan B. Holmes, assistant aquatic biologist, is now engaged in an intensive study of these fish and has found relatively high percentages of 4, 5, and 6 year fish in the commercial catches. While the study is too incomplete to warrant definite conclusions, the indications are that, while the 5-year fish usually predominate, they form, on the average, only about 50 per cent of the total run. Approximately 20 per cent are 4-year fish, and 30 per cent are 6-year fish. Such a condition would inevitably bring about a lack of the definite periodicity that is characteristic of runs in which a single age group is strongly predominant, and it would also tend to smooth out the fluctuations so that they would not be so extreme. It seems very probable that this is the explanation of the peculiar character of the deviations from the trend shown in Figure 3.

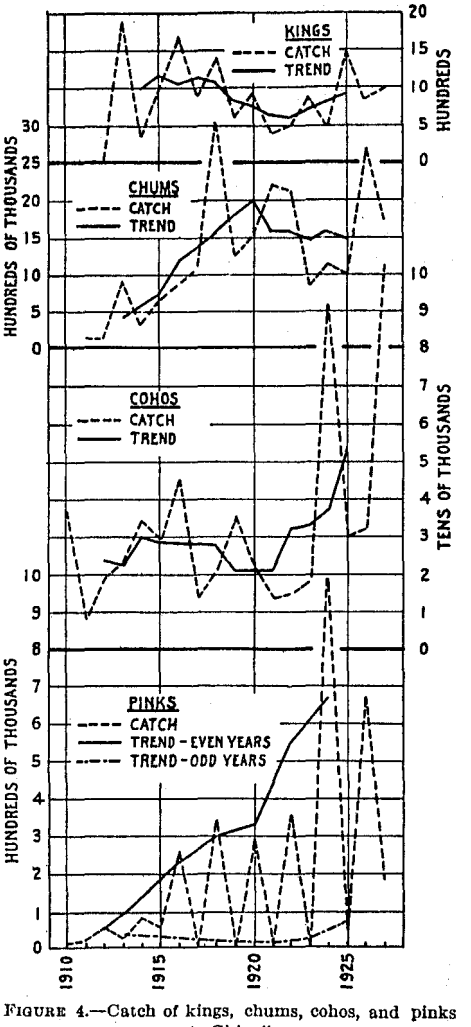

FIGURE 4.—Catch of kings, chums, cohos, and pinks at Chignik

OTHER SPECIES

The catches of the other species of salmon, especially pinks, chums, and cohos, are not derived so largely from the Chignik runs but include fish derived from smaller streams entering Aniakchak, Kujulik, and Hook Bays. These districts were not regularly fished previously to 1917, and the effect of this development is clearly apparent in the records of the catches of these three species. The catches of all the cheaper grades of salmon were irregular previous to about 1910 or 1912, so that attempts at analyses have been limited to the subsequent years. The data are shown graphically in Figure 4.

The pink salmon show the characteristic 2-year cycle with large runs on the even years and small runs on the odd. The trend of the catches in the even years (moving average by threes) shows a steady rise which, however, is affected greatly by the very large catches of 1924 and 1926. In order to show more clearly, and to some extent graphically, the nature of the changes in the catch of pinks, Table 2 is presented which shows for each year the extent to which fish from each locality entered into the total catch. It is apparent from this that the heavy catches of 1924 and

1926 were the result of exceptionally good runs at Aniakchak and Hook Bays. The catch of 1924 in Chignik Bay was indeed unusually good and when the catches at Aniakchak and Hook Bays are added we have the very high total catch noted. The catch in Chignik Bay fell off again, however, in 1926, although the good catches in the other localities held up the total catch for the district to a level approximately that of 1924. The recent increase in the catch of pinks in the Chignik district, therefore, is seen to be due to the extension of the fishery to new grounds, and it does not seem probable that the increase will continue unless there is further extension of the fishery to include other districts that produce pink salmon. The catches in the odd years have been insignificant except in 1927 when there was a very good catch of over 180,000 fish in Chignik Bay alone. The catches in the other localities were, however, not much, if any, greater than normal so that, whatever affected the catch in Chignik Bay, it seems probable that similar conditions did not obtain in other near-by places. This increased catch of pinks at Chignik in 1927 may indicate that the odd-year runs are "building up" or it may be the result of some change in the fishing intensity for this species which the authors have been unable to trace.

TABLE 2.—*Graphic table of catches of pink salmon in Chignik district*

[Each letter represents a catch of 20,000 fish except that fractional parts of this unit catch are considered as full units. Thus any catch up to 20,000 will be represented by a letter; any catch between 20,000 and 40,000 will be represented by two letters, etc. The letter "B" indicates the catch in Chignik Bay and Lagoon; "A" the catch at Aniakchak; "E" the catch at Hook Bay; and "G" the catch at Kujulik]

Year	Catch
1910	B
1911	BB
1912	BBB
1913	BBE
1914	BBBBB
1915	BBB
1916	BBBBBBBBBBBBB
1917	BA
1918	BBBBBBBBBBAAAAAAAAG
1919	BAG
1920	BBBBBBBBBBBBBAAG
1921	BB
1922	BBBBBBBBBBBBBBBBBB
1923	B
1924	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBAAAAAAAAEEEEEEEEEEEE
1925	BAAE
1926	BBBBBBBBBBBBAAAAAAAAAAAAAAAAEEEEEEEEGGG
1927	BBBBBBBBAAEG

The catch of cohos is shown graphically in Figure 4 and also in Table 3. Throughout the period under discussion the catch in Chignik Bay has been by far the most important and was exceeded only in 1926 by the catch at Aniakchak. The trend was generally downward between 1910 and 1923, but remarkable catches were made in both 1924 and 1927. The poor catches of 1921 and 1923 were undoubtedly due, at least in part, to the poor market for the cheaper grades of salmon that prevailed at that time, and this has affected the trend. In spite of the general downward tendency up to 1924 it seems doubtful that any real depletion had taken place; the sudden increase in 1924 to a level more than twice as high as that of any previous year would certainly indicate that the spawning reserves were adequate to produce a good run, at least under favorable conditions. It is interesting to note that the peak runs of 1916 and 1924 were followed by other peak runs three years later. This strongly indicates that the Chignik cohos are predominantly 3-year fish although it is known that in some other near-by districts a large proportion of the fish of this species are 4-year fish.

TABLE 3.—*Graphic table of catches of coho salmon in the Chignik district*

[See Table 2 for explanation. Each letter in this table represents a catch of 2,000 fish]

Year	Catch
1910	BBBBBBBBBBBBBBBBBB
1911	BBBB
1912	BBBBBBBBBB
1913	BBBBBBBBBBBB
1914	BBBBBBBBBBBBBBBBBB
1915	BBBBBBBBBBBBBBB
1916	BBBBBBBBBBBBBBBBBBBBBBB
1917	BBBBBBBAG
1918	BBBBBBBBBBAA
1919	BBBBBBBBBBBBBAAAAAA
1920	BBBBBBBBBBBA
1921	BBBBBBB
1922	BBBBBBBB
1923	BBBBBBBBBB
1924	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBAE
1925	BBBBBBBBBBAAAAAAE
1926	BBBBBBAAAAAAAAAAEE
1927	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBAAAAAEEEG

Considering the Chignik district as a whole the catch of chums, as shown in Figure 4, gradually increased until about 1918 and has since maintained a fairly constant level. Table 4, however, shows that this level has been maintained by large catches made at Aniakchak, Hook, and Kujulik Bays particularly in 1926 and 1927. The average annual catch in Chignik Bay alone was approximately twice as great during the period from 1918 to 1922, inclusive, as it has been at any time since. It is probable, however, that the regulations have affected the catch of chums as they did the catch of reds so that the lowered productivity since 1922 can not be taken as evidence of depletion.

TABLE 4.—*Graphic table of catches of chum salmon in the Chignik district*

[See Table 2 for explanation. Each letter in this table represents a catch of 5,000 fish]

Year	Catch
1910	
1911	BBB
1912	BBB
1913	BBBBBBBBBBBBBBBBEE
1914	BBBBBBB
1915	BBBBBBBBBBBBBB
1916	BBBBBBBBBBBBBBBBB
1917	BBBBBBBBBBBAAAAGGGGGGG
1918	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBAAAAAAAAAAGGGGGGG
1919	BBBBBBBBBBBBBBBBAAAAAAGGGGGG
1920	BBBBBBBBBBBBBBBBBBBBBBBBBBBAGG
1921	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
1922	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
1923	BBBBBBBBBBBBBBBBB
1924	BBBBBBBBBBBBBBBBBBAEEG
1925	BBBBBBBBBBBBBBBAAAEEEGG
1926	BBBBBBBBBBBBBBBBBBBBBAAAAAAAAAAAAAAAAAEEEEEGGGGGGGGGGGGG
1927	BBBBBBBBBBBBBBBBBBBBBBAAAAAAEEEEGGGG

TABLE 5.—*Graphic table of catches of king salmon in the Chignik district*

[See Table 2 for explanation. Each letter in this table represents a catch of 50 king salmon]

Year	Catch
1912	B
1913	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
1914	BBBBBBB
1915	BBBBBBBBBBBBBBBBBBB
1916	BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
1917	BBBBBBBBBBBBBBBBAAG
1918	BBBBBBBBBBBBBBBBBBBBBBAAAAA
1919	BBBBBBBBBBBB
1920	BBBBBBBBBBBBBBBBB
1921	BBBBBBBB
1922	BBBBBBBBB
1923	BBBBBBBBBBBBBBBBB
1924	BBBBBBBBBBE
1925	BBBBBBBBBBBBBBBBBBBBBBBBEEEE
1926	BBBBBBBBBBBAEEEEEE
1927	BBBBBBBBBBBBBBBBBAAAEEG

The king salmon constitute a relatively unimportant element in the salmon catch at Chignik. The annual catch has never exceeded 2,000 fish, and the average is less than 1,000. The average catch was relatively low from 1919 to 1924, but since then has been about the same as in the earlier years. It seems probable that the fluctuations are due chiefly to chance or to temporary fluctuations in abundance that can not be definitely assigned to depletion.

SHELIKOF STRAIT

The Shelikof Strait district includes the waters of the Alaska Peninsula between Cape Douglas and Cape Providence. The data are presented in Table 6.

Until 1918, the only salmon fishery in the district was at Kaflia Bay, where the earliest recorded catch was made in 1909. However, this bay had been visited occasionally before 1900 by fishermen from Karluk when the run at that place was slack. Excursions of this kind were not uncommon, and discoveries were thus made of salmon streams in outlying districts. The fish caught on such cruises were taken to the canneries at Karluk and Uyak Bay and counted as Karluk salmon. Therefore, no records are known to the bureau that give any conception of the number of fish taken at Kaflia Bay before 1909, or that indicate the year in which operations first began. Authentic statistics of catches were obtainable only after the saltery was opened in 1909. From then until 1924, the figures are presumed to be complete. Since 1924, commercial fishing in Kaflia Bay has been prohibited.

TABLE 6.—*Salmon catch and fishing appliances used in the Shelikof Strait district, 1909 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Douglas, Cape: 1919		2,500	4,500									
Douglas Island: 1919	600	4,000	3,900	233	6,125							
Hallo Bay: 1927		1,228	1,865									
Kaflia Bay:												
1909					45,088							
1910					33,827							
1911					56,958							
1912			456		70,303							
1913					84,462							
1914					41,367							
1915					4,628							
1916					443							
1917					335							
1919					296							
1921					894							
1922					1,971							
1923		1	11		10,747							
1924					9,429							
Kiukpalik Island: 1927	612	2,273	12,291	172	1,458							
Scharck Lagoon: 1924	6,640											
Unallocated:												
1925	6,057	300	4,024		1,827							
1926	2,724	3,090	10,910		9,377							
1927	10,782	885	8,915		10,251							
Total:												
1909					45,088							
1910					33,827							
1911					56,958							
1912			456		70,303	6	600			2	150	
1913					84,462	2	200			2	130	
1914					41,367	2	180			4	272	
1915					4,628	2	150					
1916					443							
1917					335							
1919	600	6,500	8,400	233	6,421					5	300	
1921					894							
1922					1,971	1	90	1	200			
1923		1	11		10,747							
1924	6,640				9,429	1	50			2	50	
1925	6,057	300	4,024		1,827							
1926	2,724	3,090	10,910		9,377			1	80	1	90	
1927	11,394	4,386	23,071	172	11,709	2	160					1

NOTE.—No catches were reported in the years not shown in the table. Hallo Bay is also known locally as Wide Bay.

This is mainly a red-salmon fishery, as in the 14 years for which records are available only in 1912 and 1923 has any other species of salmon been taken. A few pinks and one chum were taken in those years. The fishery draws for its supply of red salmon upon a run that breeds in a small stream that enters the head of Kaflia Bay and drains a small lake not far inland. There is no reason to suppose that fish belonging to any other district are taken in the Kaflia Bay fishery.

As a result of the Katmai eruption in 1912 Kaflia Bay and the surrounding country received a heavy covering of volcanic ashes and pumice which entirely stopped the flow of water in many streams. Yet this bay, notwithstanding its proximity to the volcano and central location in the zone most heavily covered with ashes, produced in that year 70,303 red salmon, the largest catch that had then been made and which has been exceeded only by the catch in 1913. It was the more amazing because 80 per cent of the take was made after the eruption, which occurred early in June just when the run was beginning. That the salmon came and remained in the bay waiting for the stream to flow again is certainly a striking manifestation of the homing instinct of the salmon. The conditions in and about the mouth of the stream were observed during the summer of 1912 and were extremely abnormal. The water was very low, due in part to scanty rains, and the meager flow was filled with the finely powdered volcanic ash. Martin in his article on the Katmai eruption [5] quotes a graphic description of the conditions in Kaflia Bay given by Ivan Orloff, a resident of Afognak who was in Kaflia Bay at the time of the eruption. He says in part: "All the rivers are covered with ashes, just ashes mixed with water." The chemical conditions in the stream must have been fully as abnormal as the physical conditions, although nothing is known definitely about this. There is some evidence given by Martin that fumes from the volcano were such that rain was made distinctly acid. On August 15 "rain fell during the middle of the morning. The drops of water striking the eyes produced a sharp pain, and brass and silver were tarnished by the drops." In spite of all these unusual conditions the salmon remained in the bay and apparently held as rigidly to their habit of returning to the parent stream as ever. Extremely modified conditions did not lead them to seek another spawning stream, although it is difficult to imagine how a stream might be more radically changed than by the eruption. Certainly such an incident should give pause to those who would explain the mechanism of the homing "instinct" on relatively simple physico-chemical grounds.

Four years later the catch dropped to 443; in 1917, five years after the eruption, it was still lower, being only 335. In these figures, then, may be found substantial proof of the correctness of the observation that very few salmon spawned successfully in the stream at Kaflia Bay in 1912, and that the small returns in 1916 and 1917 may have been the progeny of salmon that ascended the stream before June 6, 1912, the date of the beginning of the Katmai eruption. This sudden depletion of the run was probably due not alone to the eruption and the consequent destruction of the spawning grounds for that and the next few years, but in part to the heavy inroads that were made into the run by the commercial fishery during the period from 1909 to 1914. During each of these years large catches of red salmon were made, ranging from nearly 34,000 in 1910 to over 84,000 in 1913. The combined effect of the eruption and of this heavy fishing was practically to destroy the run so far as its value as a commerical resource was concerned. Since 1914 very few fish

[5] The Recent Eruption of Katmai Volcano in Alaska. By George C. Martin. The National Geographic Magazine, Vol. XXIV, No. 2, February, 1913.

have been taken in Kaflia Bay, although the slightly increased catches of 1923 and 1924 would indicate that the run was building up to some extent. It would seem that a careful and continued study of this run would provide observations of great interest and value in determining the capacity of a run to rehabilitate itself after virtual extermination.

In the first three years for which we have statistics, Kaflia Bay was fished by one operator who packed from 500 to 900 barrels of red salmon a year. Fishing appliances consisted of small beach seines and short gill nets. A small crew of natives performed all the labor both in the catching and the pickling of the fish. Fishing was far from being intensive, thus permitting a good escapement of spawning fish. Unfortunately for the Kaflia Bay salmon and the packer as well he extended his operations into the Afognak field and devoted most of his time to supervision of these ventures instead of giving undivided attention to the older fishery at Kaflia Bay, where his interests were respected by all packers in the Kodiak area. As a result Uyak Bay fishermen, knowing that the native fishermen at Kaflia, being residents of Afognak, had been returned to their homes on account of the eruption and that the bay had apparently been abandoned, went to Kaflia with their larger seines and literally scooped out the whole school of salmon waiting to ascend the stream. This performance was repeated in 1913 and a catch of 84,462 reds resulted, which is the largest ever taken in that locality. Five years later not a salmon was caught. In 1914 and 1915 the catch was respectively 52 and 94 per cent below the record yield of 1913. In the period from 1916 to 1921 less than 1,000 fish were taken in any year, while in 1918 and 1920 no salmon were caught. In 1923 there was a decided improvement in the run as the catch reached a total of 10,747 reds; this was followed by a drop to 9,429 in 1924. Since then Kaflia Bay has been closed to all commerical fishing for salmon.

In 1924 a clam cannery was opened on Kukak Bay and a small pack of salmon was made in each year to 1927. The fish were obtained in part from localities listed in the table, but mostly from unnamed waters. The catch at Kiukpalik Island in 1927 was made by a trap operated in connection with a cannery at Kodiak, and those in 1919 at Cape Douglas and Douglas Island by gill nets also went to the Kodiak cannery. The unallocated catches of this district came from waters between Cape Douglas and Wide Bay.

KODIAK AND AFOGNAK ISLANDS

ALITAK BAY

The Alitak Bay district includes all the waters of Alitak Bay and its tributaries from Cape Alitak on the west to Cape Trinity on the east. It is a compact district with a fishery distinctively its own, as far as is now known. The data are presented in Table 7; those for the years previous to 1904 were taken from Moser and from the various reports of Treasury agents.

RED SALMON

This fishery was centered for 20 years on Olga Bay red salmon, as in that period no other species was taken except cohos, and then only in six seasons. Fishing began in 1889, when two canneries, one on Olga Bay and the other on Olga Strait, were built and made packs of reds. The latter plant was operated two seasons, and in 1891 it received a share of the pack of the cannery on Olga Bay and was subsequently

moved to Karluk, leaving but one cannery in this locality. This situation continued without change until 1918, when a second cannery was established that has continued operations up to the present time.

The recorded catch of red salmon is given graphically in Figure 5. In the 39 years covered by this review, 1889 to 1927, the district has produced an average of over 400,000 red salmon annually. The catch has fallen below 200,000 only three times, the last time in 1923, when only 165,945 fish were taken—the smallest catch on record. In 1917 and in 1921 the catch exceeded 950,000 red salmon, while in seven other years it was more than 500,000. These figures show extraordinary pro-

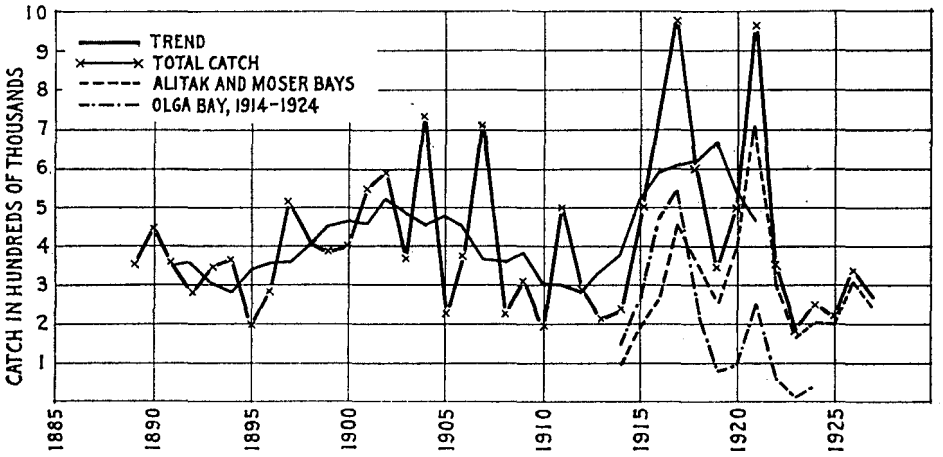

FIGURE 5.—Catch of red salmon at Alitak, Moser, and Olga Bays

ductivity for a district that embraces no stream comparable in size even with Red River, Uganik Creek, or many of the other streams of Kodiak Island.

TABLE 7.—*Salmon catch and fishing appliances used in the Alitak Bay district, 1889 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Alitak and Moser Bays:												
1914	4,000	3,000	90,000		90,000							
1915	7,000	6,000	26,000		180,000							
1916	597	4,598	72,264		257,510							
1917	2,025	2,169	2,458		443,382							
1918	17,428	16,627	542,166	747	341,352							
1919	52,126	16,340	32,521		248,756							
1920	47,287	40,349	514,262		396,947							
1921	22,972	19,525	30,799		720,584							
1922	29,458	71,842	777,287		294,994							
1923	22,255	14,852	288,758		162,772							
1924	22,045	19,037	589,513		197,562							
1925	18,614	21,921	487,043	9	190,691							
1926	35,022	57,030	648,175	55	308,642							
1927	6,692	15,062	539,200	55	235,495							
Dead Bay: [1]												
1912		5,400										
1919			4,500									
1920			93,000									
1922		35,000	20,000									
1924	2,000	24,724	293,381									
1925	1,142	23,484	377,783		5,805							
1926	2,403	32,312	275,322	17	14,838							
1927	753	37,208	774,765	45	19,978							
Olga Bay:												
1889					343,005							
1890					443,911							
1891					345,800							
1892					274,001							
1893					335,101							
1894					360,360							
1895	8,321				190,982							

See footnotes at end of table.

TABLE 7.—*Salmon catch and fishing appliances used in the Alitak Bay district, 1889 to 1927*—Con.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Olga Bay—Con.												
1896					[2] 277,860							
1897					[3] 513,000							
1898					[4] 409,184							
1899	2,024				380,798							
1900					395,446							
1901					540,982							
1902					586,989							
1903					356,188							
1904	2,200				730,733							
1905	1,863				213,080							
1906	1,242				364,958							
1907					707,562							
1908	3,896				218,033							
1909	460		112,169		308,784							
1910	3,327		38,187		174,450							
1911	1,440	6,492	201,809		495,496							
1912	2,452	2,772	33,871		284,314							
1913	3,901	3,822	198,111		208,497							
1914	5,164	9,520	183,030		139,241							
1915	10,841	8,420	100,403		255,368							
1916	227	10,030	83,308		465,805							
1917		2,000	2,300		532,118							
1918	6,794	25,655	478,623	73	228,250							
1919	4,994	7,322	1,200		72,144							
1920			32,000		88,409							
1921	3,216	3,964	2,500		245,612							
1922					52,890							
1923	5,565	4,951	762		3,173							
1924	7,964	3,814	8,590		41,197							
1925	693	6,488	5,630		3,275							
Portage Bay:												
1920			73,000									
1924		20,961	81,766									
1925	3,890	16,277	259,479		9,390							
1926	5	15,302	47,053		116							
1927	3,879	49,963	462,991	21	16,696							
Total:												
1889					343,605							
1890					443,911							
1891					345,800							
1892					274,001							
1893					335,101							
1894					360,360							
1895	8,321				190,982							
1896					[2] 277,860	5	1,000					
1897					[3] 513,000	5	1,000					
1898					[4] 409,184	5	1,000					
1899	2,024				380,798	6	1,200					1
1900					395,446	6	1,200					1
1901					540,982	8	1,600					1
1902					586,989	6	1,200					
1903					356,188	5	1,000					
1904	2,200				730,733	5	1,500			2	200	1
1905	1,863				213,080	5	1,500					
1906	1,242				364,958	6	1,800					
1907					707,562	5	1,500					
1908	3,896				218,033	5	1,500					
1909	460		112,169		308,784	4	1,200					1
1910	3,327		38,187		174,450	4	700					1
1911	1,440	6,492	201,809		495,496	4	960					1
1912	2,452	8,172	33,871		284,314	3	835					1
1913	3,901	3,822	198,111		208,497	4	1,090					
1914	9,164	12,520	273,030		229,241	4	615					1
1915	17,841	14,420	126,403		435,368	4	615					2
1916	824	14,628	155,572		723,315	6	1,570					2
1917	2,025	4,169	4,758		975,500	6	1,500					2
1918	24,222	42,282	1,020,789	820	569,602	10	1,695			1	100	6
1919	57,120	23,662	38,221		320,900	11	2,136			1	100	7
1920	47,287	40,349	712,262		485,356	10	1,638	2	550	2	150	10
1921	26,188	23,489	33,299		966,196	8	1,348	1	250			11
1922	29,458	106,842	797,287		347,884	9	1,400	2	500	4	600	11
1923	27,820	19,803	289,520		165,945	5	750					3
1924	32,009	68,536	973,250		238,759	7	1,050					7
1925	24,339	68,170	1,129,935	9	209,161	7	920					6
1926	37,430	104,644	977,550	72	323,596	8	970					5
1927	11,324	102,233	1,776,956	121	272,169	9	1,030					5

[1] Also known as Deadmans Bay. [2] Computed at 12 fish per case. [3] Computed at 13.7 fish per case.
[4] Included in this catch are 50,000 fish transferred to canneries at Uyak and 10,000 to Karluk canneries. The Olga Bay cannery also packed 60,000 red salmon from Red River (Ayakulik) and 35,000 from Chignik.

Almost if not quite the entire run of red salmon in this district is destined to the small streams of Olga Bay, although the table shows that between 1914 and 1924 there was a complete shift of fishing operations from Olga Bay to Alitak and Moser Bays; as the catches increased in Moser Bay there were corresponding decreases in

the catches at the fishing grounds of Olga Bay. This shift in the fishing areas was accompanied by a shift in the type of gear used from seines to traps. The red salmon taken in Alitak and Moser Bays are undoubtedly Olga Bay fish, however, since the salmon entering Olga Bay must pass through Moser Bay, which is little more than a widening of the lower end of Olga Strait. It has been necessary for us to treat Moser and Alitak Bays as a single unit since in several years since 1914 the catches were reported as from "Alitak and Moser Bays," and it has been impossible to segregate the catches made in these two bays.

Alitak Bay is, however, the channel through which all salmon taken in Olga, Moser, Dead, and Portage Bays have approached their particular streams, so that a strict allocation of catch to the respective bays is not essential to a correct understanding of conditions in this district, at least in so far as the red salmon are concerned. Traps located on the east shore of Alitak Bay and traps set near the entrance of or between Dead Bay and Moser Bay take some red salmon. There are, however, no red salmon streams in Portage Bay or Dead Bay, and no red salmon were reported from either locality until 1925. There is no evidence that the red-salmon catch of this district draws upon other than the Olga Bay runs, nor is there evidence that this run is drawn upon by fisheries in other localities.[6]

Olga Bay has seven tributary streams which are used by salmon, but of these only four are recognized as red-salmon streams, and two of these are of little consequence. The important red-salmon streams are thus only two in number; one enters the bay from the north about midway between the east and west ends of the bay, and the other empties from the south near the west end of the bay. These streams are about 30 feet in width, 2 feet in depth, and flow at the rate of about 1½ miles an hour. The south stream is by far the more important; it is the outlet of two small lakes and several ponds; and upon its production of red salmon, the fishery largely depends. A comparison of these two streams shows the south stream produces six times as many red salmon as the north stream. Of the less important streams, the one at the east end of the bay known as Horse Marine has provided the greater number of reds in late years, whereas 30 years ago the one in the northwest section of the district at Silver Salmon Bay was the more productive.

Since 1924 the commercial catch of red salmon in the Alitak Bay district was restricted by the imposition of Federal regulations authorized under the act of Congress of June 6, 1924, providing that the escapement in streams where weirs are maintained for the purpose of counting salmon, shall equal the commercial catch. Weirs were first set across the north and south streams in 1923, and counts were made as shown in Table 8:

TABLE 8.—*Olga Bay red salmon runs from 1923 to 1927*

Year	North Stream	South Stream	Total known escapement	Commercial catch	Total known run
1923	15,855	167,775	183,630	165,945	349,575
1924	19,867	302,008	321,875	238,759	560,634
1925	40,910	509,700	550,610	209,161	759,771
1926	105,142	789,947	895,089	323,596	1,218,685
1927	87,949	497,619	585,568	272,169	857,737

In addition to the foregoing, there was an estimated escapement of 25,000 reds into Horse Marine stream in 1926, while a similar estimate in 1927 gives that stream

[6] It has been noted in the past year or two, however, that many of the fish passing through the weirs in this district bear the marks of gill nets. Just where the Olga Bay fish pass through a gill-net fishery is not definitely known but it seems probable that it is along the northwest coast of Kodiak Island.

an escapement of 30,000 and at Silver Salmon Bay, 5,000; thus bringing the total escapement for the respective years to 920,089 and 620,568, and the total known run of reds to 1,243,685 in 1926 and 892,737 in 1927.

The general trend of the red-salmon catch at Alitak is shown in Figure 5 and was determined by a moving average by fives. It is seen that the catches were above average for a considerable period between 1895 and 1908, were relatively low from 1908 to 1915, and then were high again until about 1923. Beginning with 1924 the catches have been materially affected by the regulations and the records can not be considered as comparable with those of earlier years. Extraordinary catches were made in both 1917 and 1921—catches that were considerably higher than any recorded before or since. So far as we can determine there was no material change in the intensity of fishing during this period, and it seems safe to conclude that the runs were unusually large in these years. The fluctuations of the trend, or long-time movement, do not clearly indicate depletion although the reduced catches in recent years may be due in part to this condition. It can not be said, however, that there are definite evidences of depletion shown by these data since the shift in the nature of the fishery that has occurred since 1914 may have obscured any change in general abundance that has taken place.

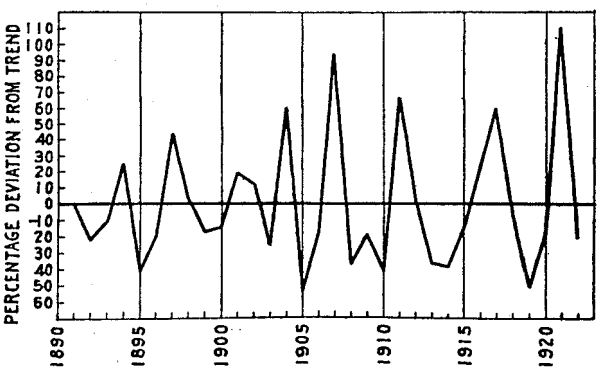

FIGURE 6.—Percentage fluctuation from the trend of the catch of red salmon at Alitak

The cyclical or short-time changesare very irregular at Alitak as is shown by Figure 6, which shows the yearly fluctuations about the trend as a percentage of the trend. The coefficients of correlation in the cyclical fluctuations at 4 and 5 year intervals have been calculated and found to be statistically insignificant. (See Part I, p. 62, for a discussion of this procedure.) Inspection of the data showed also that there was no significant correlation at 6-year intervals, although the coefficient was not calculated. The value of "r" for the 4-year interval was $+0.247 \pm 0.119$, and for the 5-year interval $+0.204 \pm 0.124$. It is evident that there are no clear-cut cycles of abundance in the Alitak red salmon such as have been demonstrated for the Bristol Bay and Karluk fish. This is presumably due, as at Chignik, to the fact that the fish are not so predominantly of a single age group. Observations made by the late Dr. C. H. Gilbert showed wide fluctuations in the abundance of different age groups at different times during the season of 1914. The predominant age during the latter part of the season was 5 years, but earlier in the season 6-year and even 7-year fish were very common. Since these observations cover only the one year, and that some time ago, they can not be considered as certainly typical of the runs of this district, but the presence of relatively large percentages of at least two age groups indicates that this condition may be the cause of the lack of correlation in the catches at definite intervals.

OTHER SPECIES

Previous to 1909 the catch of species other than reds was confined to occasional years in which a few cohos were taken. Beginning in 1909 and continuing through 1927, catches of coho, chum, and pink salmon, particularly the latter, were regularly

made in this district. In recent years, however, the greater part of the catch of these species has come from Alitak, Portage, and Dead Bays, with comparatively small catches in Olga Bay except in 1918 when over half a million were reported. The data are presented graphically in Tables 9, 10, and 11.

As pointed out elsewhere in this review, a peculiar situation exists at Alitak in respect to abundance and scarcity of pink salmon. At the beginning of fishing for pink salmon in 1909, the heavier runs occurred in the odd years, but from 1914 to 1924, inclusive, the even years were by far the most productive. In 1925, the heavy runs swung back to the odd years, the catch in both that year and 1927 exceeding 1,000,000. The highest level of production was reached in 1927 with a catch of 1,776,956, which may be regarded as evidence of an increasing supply of pinks in this district as there is no evidence that fishing was more intense. No information is available whereby an approximation of the escapement of pinks can be shown. Relatively small numbers were counted through the weirs maintained in two red-salmon streams, yet the run seems to be entirely local, and not, as in some other Kodiak Island localities, a body of migrating salmon.

TABLE 9.—*Graphic table of catches of pink salmon in Alitak district*

[Each letter in this table represents 50,000 fish. The letter "A" indicates the catch in Alitak and Moser Bays; "Q" the catch in Dead Bay; "O" the catch in Olga Bay; and "V" the catch in Portage Bay]

Year	Catch
1909	OOO
1910	O
1911	OOOOO
1912	O
1913	OOOO
1914	OOOOAA
1915	OOOA
1916	OOAA
1917	OA
1918	OOOOOOOOOOAAAAAAAAAAA
1919	OAQ
1920	OAAAAAAAAAAQQVV
1921	OA
1922	AAAAAAAAAAAAAAAAQ
1923	OAAAAAA
1924	OAAAAAAAAAAAAQQQQQQQVV
1925	OAAAAAAAAAAQQQQQQQQVVVVVV
1926	AAAAAAAAAAAAAQQQQQQQ
1927	AAAAAAAAAAAQQQQQQQQQQQQQQQQVVVVVVVVVV

TABLE 10.—*Graphic table of catches of cohos in Alitak district*

[Each letter in this table represents 2,000 fish. See Table 9 for explanation of letters]

Year	Catch
1909	O
1910	OO
1911	O
1912	OO
1913	OO
1914	OOOAA
1915	OOOOOOAAAA
1916	OA
1917	AA
1918	OOOOAAAAAAAAA
1919	OOOAAAAAAAAAAAAAAAAAAAAAAAAAAA
1920	AAAAAAAAAAAAAAAAAAAAAAAA
1921	OOAAAAAAAAAAAA
1922	AAAAAAAAAAAAAA
1923	OOOAAAAAAAAAAA
1924	OOOOAAAAAAAAAAAQ
1925	OAAAAAAAAAAQVV
1926	AAAAAAAAAAAAAAAAAAQQV
1927	AAAAQVV

TABLE 11.—*Graphic table of catches of chum salmon in Alitak district*

[Each letter in this table represents 5,000 fish. See Table 9 for explanation of letters]

Year	Catch
1911	OO
1912	OQQ
1913	O
1914	OOA
1915	OOAA.
1916	OOOA
1917	OA
1918	OOOOOOAAAA
1919	OOAAAA
1920	AAAAAAAAA
1921	OAAAA
1922	AAAAAAAAAAAAAAAQQQQQQQQ
1923	OAAA
1924	OAAAAQQQQQVVVVV
1925	OOAAAAAQQQQQVVVV
1926	AAAAAAAAAAAAQQQQQQQVVVV
1927	AAAQQQQQQQQQVVVVVVVVVV

The presence of pink salmon in these waters in such unusual and increasing numbers may reasonably cause speculation as to the failure to utilize them in any considerable quantities before 1918. Since exactly the same situation obtains in respect to cohos and chums, it would appear that no effort was made to take these cheaper grades of salmon until the new cannery was opened in that year. The shift of the fishery from Olga Bay to the outer bays and from a seine to a trap fishery may have been the chief cause of the increased catches.

The catches of cohos and chums show no special features other than the increased catch in the years since 1918, which was mentioned above. King salmon were reported in only four years. The first catch was made in 1918 when 820 were taken. No more kings were reported until 1925, and since then the yearly catches range from 9 to 123. This species has evidently no real economic importance.

RED RIVER DISTRICT

The Red River district is composed of the coastal waters of Kodiak Island from Cape Karluk on the north to Cape Alitak on the south, and it embraces but few salmon streams, of which Red River is the only important one. At one time there was some fishing at a stream near Low Cape, but the catches there were insignificant and were reported as Red River fish. Sturgeon River near the northern end of the district produced a few cohos in two widely separated years and in 1920 a small catch of pinks was made. Red River is properly known as Ayakulik River and is so referred to in the reports by Moser who says: "Among cannery men it is known as Red River, but this name should not be confounded with the Red River which lies 6 miles to the northward according to Coast Survey chart No. 8500" (Moser, 1902). On account of the present universal use, the name "Red River" has been adopted for this stream.

The data for this district are given in Table 12.

TABLE 12.—*Salmon catch and fishing appliances used in the Red River district, 1896 to 1922*

Year	Coho	Chum	Pink	King	Red	Beach Seines	
						Number	*Fathoms*
Red River:							
1896					42,000		
1898					60,000		
1900					285,000		
1901[1]					200,000		
1902[1]					200,000		
1903[1]					100,000		
1904					167,175	7	
1905					58,805	7	
1906					163,465	10	
1907					312,377	10	3,000
1908			17,381		286,112	4	2,000
1909					201,007	4	1,600
1910			16,317		99,308	4	2,000
1911					176,788	4	1,800
1912		1,495	67,523		412,907	4	1,600
1913			615		293,439	4	1,600
1914			42,188		142,657	4	1,600
1915				15	212,124	4	1,600
1916		124	22,210		215,142	3	1,500
1917		33	49		222,376	3	1,500
1918		942	167,914	152	147,191	3	1,500
1919		75	27	364	80,375	3	750
1920		23	52,006	66	14,632	4	1,200
1921					28,977		
1922			26,862		12,222		
Sturgeon River:							
1910	5,000						
1920			7,138				
1922	4,000						

[1] Catches estimated.

NOTE.—The catch of red salmon at Red River in 1901, 1902, and 1903 was estimated and deducted from the reported catch at Karluk, as there was no allocation to Red River in those years. No catch was reported in the years not shown in this table.

Little is known of the early history of salmon fishing at Red River, but available records indicate that operations began soon after the establishment of canneries at Karluk and Olga Bay. These meager records give in general the impression that a considerable run of red and humpback salmon came to this stream, and that such catches as were made there formed appreciable parts of the packs at near-by canneries. The first authentic record of a catch of salmon at Red River, however, was made by the Alaska Improvement Co. in 1896 when 42,000 reds were taken at that fishery and packed at Karluk; yet it is a generally accepted fact that commercial fishing had been carried on annually for several years prior thereto. Stream statistics were not kept for publication in those years, as the item of chief interest was the number of cases packed regardless of the source of the salmon procured. Usually the pack of any cannery was allocated, if at all, to the important stream nearest the location of the plant, so in that way the catches at Red River in several seasons were lost in combination with catches at Karluk, Olga Bay, Uganik, and probably Chignik. In 1902, Moser [7] reported that the catch of red salmon off the mouth of Red River in 1900 was estimated at 700,000 and that early in August pink salmon schooled in such numbers at the mouth of the river as to stop fishing for reds since pinks were then regarded as almost worthless. If this figure is even approximately correct, a large part of the catch is unaccounted for inasmuch as the detailed catch statistics given also by Moser show only that 285,000 red salmon were taken that year, of which 25,000 were packed at Alitak, 242,500 at Karluk, and 17,500 at Uganik. There is no way of knowing which of these estimates is nearest the truth but the smaller figure has been adopted since the larger one is greatly in excess of the maximum catch reported in any other year.

[7] Alaska Salmon Investigations in 1900 and 1901, by Jefferson F. Moser. Bulletin, U. S. Fish Commission, 1901 (1902), Vol. XXI, pp. 173–401. Washington.

In 1897, no catch was reported, while in 1898 Red River produced apparently only 60,000 red salmon, all of which were canned at Alitak. There are also no records of catches in 1901, 1902, or 1903, although it may be accepted as indisputably true that once a fishery was established at Red River it was continued each year until 1922, even to the almost total extinction of the run, and was then stopped by Federal regulation.

Beginning in 1904 and thereafter through 1922, catch statistics were taken from the sworn reports of operators at Red River, though in some of these years the figures may not tell the whole story. It is likely that in the earlier years of this period, part of the salmon taken here were credited elsewhere, probably Karluk. After the elimination of all but two packing companies operating on the west coast of Kodiak Island (the Alaska Packers Association and the Northwestern Fisheries Co.) it would appear that the reported catch of salmon at Red River might be accepted without question. Yet an examination of these records reveals that the only salmon taken at that fishery in 1904, 1905, and 1907, were reported by the Northwestern Fisheries Co. In the period from 1908 to 1914, both companies fished there except in 1911 when the Alaska Packers Association confined its fishing to Karluk Beach, Uganik Bay, and Little River. From 1914 to 1921, inclusive, the entire catch of salmon at Red River went to the Uyak Bay cannery of the Northwestern Fisheries Co., so that there should be no confusion of figures for that period. The rather insignificant catch of 1922 was made by three companies which had not previously fished in that locality.

Red River is the only salmon stream of any importance in the southwest section of Kodiak Island between Karluk and Alitak Bay. It is a comparatively small stream, only about 50 feet in width, and rises in a lake and tributaries about 15 miles inland beyond the glacial moraine through which it flows to the ocean, debouching on a bold shore midway between Cape Ikolik and Low Cape. Between these points the coast is exposed to the full sweep of wind and sea from a southwesterly direction so that fishing is frequently interrupted for periods of varying length by storms from that quarter. Perhaps no season in all the history of the fishery has been without these interruptions, which in themselves should be regarded as favorable to the escapement of salmon into the stream, yet only one other known stream on Kodiak Island shows equally serious depletion of its salmon run, almost to the point of complete destruction. Considering also that Red River was strictly a beach-seine fishery, with more than average natural protection, it seems almost incredible that a substantial run should not have been stabilized in the stream. This is especially true in view of the fact that throughout the entire history of the fishery, from 1904 until 1922, operations were carried on by not more than two companies, and after 1914 by only one, and without that destructive competition which marked operations at many other localities in Alaska. In the same period no restrictive regulations were enforced other than those imposed by the act of June 26, 1906, which provided a weekly closed period of 36 hours and prohibited fishing within 100 yards outside of the mouth of all streams less than 500 feet in width.

Assuming that the law was obeyed, no satisfactory explanation of the depletion of the red salmon run to this stream can be given; but the conclusion may be reached safely that with such small streams, even favorable natural conditions for the preservation of a salmon run are inadequate unless supplemented by the enforcement of legal protection. Modern fishing methods and practices are capable of destroying a

commercial run of salmon in any stream if allowed unrestricted employment, and the smaller the stream the more readily may this be done. There seems to be no good reason why Red River can not support a run of red salmon capable of yielding between 100,000 and 150,000 fish annually for commercial use. Table 13 shows graphically a wide fluctuation in the catch of red salmon and that the maximum yield was reached in 1912 when 412,907 were taken. In 1913 the catch dropped to 293,439 and in 1914 further declined to 142,657. It increased to 212,124 in 1915, and remained slightly above that level for two years following. In 1918, the catch again dropped to 147,191, and another sharp drop in 1919 brought the catch down to 80,375. A still more serious decline occurred in 1920 when the catch fell to 14,632. The slight recovery in 1921 brought the catch only to 28,977, and this was followed in 1922 by a catch of 12,222, the lowest figure it had reached in 19 years. Since that year, commercial fishing for salmon at Red River has been prohibited. Occasional observations of the spawning grounds in Red River have been made in recent years and in 1929 a counting weir was established and an escapement of 28,980 fish recorded. This represents, no doubt, the entire run and is so far below the former productivity of the stream as measured by the catch records alone that excessive depletion is clearly indicated. The earlier reports of observations made on the spawning grounds were much more favorable than this weir count indicates, and a continuation of the weir count will be watched with great interest. We have here an opportunity to observe the natural increase of a very seriously depleted run and the results will be of great importance from both practical and scientific points of view.

TABLE 13.—*Graphic table of catches of red salmon at Red River*

[Each letter in this table represents a catch of 10,000 fish]

Year	Catch
1904	RRRRRRRRRRRRRRRR
1905	RRRRRR
1906	RRRRRRRRRRRRRRRR
1907	RRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
1908	RRRRRRRRRRRRRRRRRRRRRRRRRR
1909	RRRRRRRRRRRRRRRRRRR
1910	RRRRRRRRR
1911	RRRRRRRRRRRRRRRRR
1912	RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
1913	RRRRRRRRRRRRRRRRRRRRRRRRRRR
1914	RRRRRRRRRRRRRRR
1915	RRRRRRRRRRRRRRRRRRR
1916	RRRRRRRRRRRRRRRRRRRR
1917	RRRRRRRRRRRRRRRRRRRRR
1918	RRRRRRRRRRRRRR
1919	RRRRRRRRR
1920	RR
1921	RRR
1922	RR

The Red River fishery has produced rather limited quantities of pink salmon in each of the even years from 1908 to 1922, but these catches were wholly incidental to fishing for red salmon. Pinks were obtainable in large numbers in some seasons. Moser points out that in 1900 they schooled in dense masses off the mouth of the river early in August and put an end to fishing for red salmon before the usual closing of the season for that species. Available statistics give no indication of the size of pink salmon runs to Red River; likewise there is no information to show that king and chum salmon are taken except in very limited quantities. Cohos have not been reported from this locality at any time.

Fishing gear credited to this district was operated by the Northwestern Fisheries Co., as a part of its Karluk equipment. A division was made whereby the Red River fishery is credited with about half of the gear used by this company, but no gear of the Alaska Packers Association was allocated to this district, although the association fished here a few seasons. Neither company reported separately the gear used at Red River.

KARLUK RIVER DISTRICT

This district embraces a small section of the west coast of Kodiak Island in which the seining grounds at the mouth of Karluk River and those adjacent at Slide, Waterfall, and Tanglefoot, constitute one of the most compact fishing areas in all Alaska. Karluk River, a fine clear-water stream, is the outlet of Karluk Lake and the streams of its drainage basin, and is approximately 30 miles in length. It empties into a lagoon or estuary formed by the action of surf and tide which have thrown a high sand and gravel spit across the mouth of the river. This lagoon is about 3 miles long, and in the early days was the preferred seining ground, as operations could be carried on there without interruption by storms and heavy surf.

Although other species are taken in the fishery the remarkable red-salmon runs are of predominant importance. Both the river and the lake are relatively small, yet the abundance of red salmon is so great as to indicate that conditions are particularly favorable for this species. No other stream of similar size is known to produce such large runs, and there are only a few larger streams, such as the Fraser and the Kvichak Rivers, that have been more productive. Occasionally large runs of pinks have appeared and the three other species are taken in significant though much smaller numbers.

In the eighteenth century, Russian explorers discovered and reported great runs of salmon at Karluk, and the Indians, of course, knew of them long before the Russians came. It is a matter of record that 300,000 red salmon were prepared as "yukola" (dried without salting or smoking) in several seasons more than a century ago.[8] Yet no commercial use seems to have been made of the Karluk salmon until after Alaska was purchased by the United States in 1867. The first cannery was built on Karluk Spit in 1882, and for six seasons this one plant operated without competition. The catches increased from 58,800 in 1882 to 1,004,500 in 1887, each intervening year showing a material gain over the preceding. It seems very probable that every salmon captured in these six years was taken in Karluk Lagoon, as fishing on the outside beaches was not engaged in until the competition incident to the establishment of more canneries forced such action.

In 1888, the number of canneries increased to 4, of which 3 were located at Karluk and 1 at Larsen Bay, and the catch amounted to approximately 2,781,000. In the next year, 2 additional canneries were opened and the combined catch of the 6 plants was 3,412,000, no part of which is presumed to have been made elsewhere than at Karluk River. In 1890, the catch was 3,149,000, without change in the number of canneries. The catch in 1891 was 3,500,000, with 6 canneries still in operation. From 1892 to 1895, a period of four years, the number of canneries varied from 3 to 5, and the catch varied from 2,056,000 in 1895 to 3,350,000 in 1894. In all these years no record was made of the number of salmon caught, but the catch has been computed from the reported pack in each year at the rate of 14 fish per case.

[8] Sketches from History of American Orthodox Ecclesiastical Mission, Kodiak Mission, 1837–1894. Published by Monastery of Valaam, St. Petersburg, 1894. Translation by N. Gray, Kodiak, Alaska, 1925.

According to Moser [9] this was the number of Karluk red salmon required to pack a case in 1895 and all earlier years, and it is still about the same. In 1896, for reasons unknown, Moser computed the catch at 12 fish per case, and thus obtained a catch of 2,483,976, in addition to which 155,000 reds were transferred to canneries at Chignik. For the first time salmon were reported from Uganik, "Ayagulik" (probably intended for Ayakulik or Red River), Kaguayak, and Little River, but the estimated catches at these places were excluded from the Karluk catch. It is believed, however, that in several years before and after 1896, Karluk catch statistics were slightly in error due to the inclusion of fish taken at other localities, but no attempt has been made to correct this, except as indicated in the footnotes following Table 14. Catches by species were reported for the first time in 1897. No allocation to streams other than Karluk River was shown, although one company listed Little River, Uganik, Red River, and "Ayagulik" besides Karluk, but the catch at each place was not shown separately. In this year, Kutchin [10] reports that the catch of red salmon by the three canneries at Karluk and one at Uganik was 1,865,731. The Uganik cannery packed 2,113 cases. The Uganik fish are much larger than those at Karluk, running about 10 to the case. It is assumed, therefore, that approximately 21,000 reds were caught in Uganik Bay, and the Karluk catch as given by Kutchin has been reduced by that number. The first catch of cohos ever reported from Karluk was also made in that year. From 1897 to 1903, both years inclusive, Kutchin's catch statistics have been used and wherever salmon from other designated localities were included as Karluk fish, adjustment has been made by allocating a part of the catch to those streams. Such allocations have been based on a knowledge of local conditions, and while they are open to criticism on that account they are believed to be reasonably accurate.

Beginning in 1904 and continuing through 1927, data were obtained from statistical reports of the operators filed in Washington. In this period, then, serious error in catch statistics, while not entirely removed, is decidedly improbable. The history of this district is particularly interesting, and marks the rise and fall of one of the world's greatest red-salmon fisheries.

The data are presented in Table 14.

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[9] The Salmon and the Salmon Fisheries of Alaska, by Jefferson F. Moser. Bulletin of the U. S. Fish Commission for 1898, Vol. XVIII, pp. 1-178. Washington, 1899.

[10] Report on the Salmon Fisheries of Alaska, 1897, by Howard M. Kutchin. Treasury Department, Document No. 2010, division of special agents, Washington, 1898.

TABLE 14.—*Salmon catch and fishing appliances used in the Karluk River district, 1882 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Gill nets	
						No.	*Fathoms*	*No.*	*Fathoms*
1882					58,800				
1883					188,706				
1884					282,184				
1885					468,580				
1886					646,100				
1887					1,004,500				
1888					2,781,100				
1889					3,411,730				
1890					3,148,796				
1891					3,500,588				
1892					2,852,458				
1893					2,909,508				
1894					3,349,976				
1895					2,055,984				
1896					2,638,976	15	6,475		
1897	1,500				[1] 2,204,425	29	9,375	3	600
1898	19,175				[2] 1,534,064	29	9,800		
1899	30,451			1,104	[3] 1,399,117	29	9,950		
1900	32,239			4,838	[4] 2,594,774	31	10,450		
1901			2,015	3,838	[5] 3,985,177	41	16,400	2	200
1902	34,972			2,932	[5] 2,981,112	18	7,200		
1903	119,541		10,000	1,187	[6] 1,319,975	18	7,200		
1904	100,936		5,180	3,190	1,638,949	17			
1905	85,050			2,496	1,787,642	20			
1906	22,496			3,640	3,382,913	20			
1907	26,033			4,015	2,929,886	20	3,000		
1908	33,131		233,067	3,028	1,608,418	5	3,900		
1909	13,655			3,907	923,501	11	3,600		
1910	22,922		104,873	1,598	1,492,544	13	5,680		
1911	11,581		8,742	689	1,723,132	10	4,350		
1912	10,466	14,921	287,890	686	1,245,275	14	6,105		
1913	16,175		11,892	1,032	868,422	15	6,455		
1914	16,048		1,287,190	886	540,455	16	6,415		
1915	20,173	5,048	12,758	777	828,429	8	3,087		
1916	20,389	11,823	2,492,552	564	2,343,104	8	3,478		
1917	21,620	4,878	752	750	2,324,492	8	3,477		
1918	45,220	12,569	335,988	890	1,094,665	8	3,429		
1919	35,305	12,360	5,621	784	1,089,809	11	3,486		
1920	26,924	5,499	634,977	1,571	1,368,526	11	3,631		
1921	13,440	87	38	638	1,631,247	10	3,595		
1922	21,604	10,369	894,175	661	656,092	10	3,745		
1923	20,029	4,007	9,883	1,776	662,140	8	3,151		
1924	10,775	2,318	2,442,359	294	742,489	10	3,630		
1925	4,750	1,582	6,265	1,077	1,136,508	8	2,935		
1926	14,013	17,065	86,040	88	1,825,486	8	3,050		
1927	14,344	6,538	2,537	1,383	398,726	5	1,780		

[1] Used Kutchin's report of catch, and deducted 21,130 reds as Uganik catch.
[2] Does not include 50,000 reds transferred from Olga Bay to Uyak and 10,000 to Karluk.
[3] Does not include 15,000 reds transferred from Olga Bay to Uyak.
[4] Does not include 242,500 reds transferred from Red River and 24,000 from Uganik.
[5] Does not include 200,000 estimated catch of reds at Red River and 100,000 at Uganik.
[6] Does not include 100,000 estimated catch of reds at Red River and 50,000 at Uganik.

NOTE.—This table includes all salmon caught at Slide and Waterfall. The number of fathoms of seines used in 1901, 1902, and 1903 was estimated at 400 per seine. The gill nets used in 1901 were estimated to total 200 fathoms.

RED SALMON

Many investigations of the Karluk red-salmon fishery have been made, much has been written about it, commercial interests have battled for exclusive control and domination of it, and dire prophecies have been heard concerning its ultimate destruction. Because of these things, Karluk has undoubtedly been given more close attention than any other fishery in Alaska. Approximately 10 years ago the late Dr. C. H. Gilbert undertook a detailed study of the Karluk red-salmon runs. The senior author of this paper was associated with him in this investigation from 1926 on. One paper dealing with these investigations has been published.[11] In this report statistics were given of the catch of red salmon at Karluk from 1882 to 1926, but these data do not always agree with those presented herewith which have been derived more from original sources and are, without doubt, more reliable. For a number of the years previous to 1904 the figures given here are higher than those given by Gilbert and Rich.

[11] Investigations Concerning the Red-Salmon Runs to the Karluk River, Alaska, by Charles H. Gilbert and Willis H. Rich. Bulletin of the Bureau of Fisheries, Vol. XLIII, 1927, Part II. Washington, 1927.

This is due chiefly to our inclusion of packs made by canneries at Larsen and Uyak Bays, which were not included in the figures of Gilbert and Rich. In 1896 Moser estimated the catch on the basis of 12 fish per case, but in this report 14 has been used as being much more nearly correct for Karluk red salmon. Bureau figures checked closely with those of Gilbert and Rich for the years 1904 to 1924.

TABLE 15.—*Graphic table showing catch of red salmon at Karluk, 1882–1927*

[Each letter indicates 100,000 fish]

Year	Catch
1882	X
1883	XX
1884	XXX
1885	XXXXX
1886	XXXXXXX
1887	XXXXXXXXXXX
1888	XXXXXXXXXXXXXXXXXXXXXXXXXXX
1889	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1890	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1891	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1892	XXXXXXXXXXXXXXXXXXXXXXXXXXX
1893	XXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1894	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1895	XXXXXXXXXXXXXXXXXXX
1896	XXXXXXXXXXXXXXXXXXXXXXXXXX
1897	XXXXXXXXXXXXXXXXXXXXX
1898	XXXXXXXXXXXXXXX
1899	XXXXXXXXXXXXX
1900	XXXXXXXXXXXXXXXXXXXXXXXXX
1901	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1902	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
1903	XXXXXXXXXXXXX
1904	XXXXXXXXXXXXXXXX
1905	XXXXXXXXXXXXXXXX
1906	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1907	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
1908	XXXXXXXXXXXXXXXX
1909	XXXXXXXXX
1910	XXXXXXXXXXXXXX
1911	XXXXXXXXXXXXXXXX
1912	XXXXXXXXXXXX
1913	XXXXXXXX
1914	XXXXXX
1915	XXXXXXXX
1916	XXXXXXXXXXXXXXXXXXXXXX
1917	XXXXXXXXXXXXXXXXXXXXXX
1918	XXXXXXXXXX
1919	XXXXXXXXXX
1920	XXXXXXXXXXXX
1921	XXXXXXXXXXXXXX
1922	XXXXXX
1923	XXXXXX
1924	XXXXXXX
1925	XXXXXXXXXX
1926	XXXXXXXXXXXXXXXXX
1927	XXXX

Beginning in 1924, with the introduction of traps on the northwest coast of Kodiak Island, our figures do not agree with those published by Gilbert and Rich, and by Bower,[12] but represent catches made only in the Karluk district, which lies entirely between Cape Karluk and Cape Uyak. (See Table 15.) Previously published reports of the commercial catch of Karluk salmon from 1924 to 1927 include reds caught several miles north of Karluk and differ from our data in the following particulars: In 1924 the catch was reported as 890,752, or approximately 20 per cent more than our total for that year; in 1925 it was given as 1,317,742, or nearly 16 per cent above the total compiled by the authors; in 1926 it was 2,131,616, or about 17 per cent in excess of figures for the same year; in 1927 it was 600,778, or approximately

[12] Alaska Fishery and Fur-seal Industries in 1924, by Ward T. Bower. Appendix IV, Report, United States Commissioner of Fisheries for 1925, p. 114. Appendix III, Report, United States Commissioner of Fisheries for 1926, p. 100. Appendix IV, Report, United States Commissioner of Fisheries for 1927, p. 266. Appendix IV, Report, United States Commissioner of Fisheries for 1928, p. 101. Washington.

51 per cent above our total. As already noted, the interception of the Karluk run in these years was due largely to the operation of traps near the entrance of the bays between Outlet Cape and Karluk, and the increase in the number of salmon intercepted is in direct relation to the number of traps employed. Fishing appliances on that coast north of Cape Uyak in 1924, 1925, and 1926 took 1 fish out of the Karluk red-salmon run, as against 5 taken by seines on the Karluk beaches, whereas in 1927 with a considerable increase in the number of traps and nets 1 Karluk salmon was taken in that same area in comparison with 2 taken in beach seining at the river.

It is apparent that the development of the fishery to the north and east of Karluk River is taking an increasing percentage of the total catch of Karluk reds. Bower gives the total catch of Karluk red salmon in 1927 as 600,778 while our figures show that only 398,726 were taken at Karluk beach. Over a third, then, of the total catch was made at other points and it may be expected that further expansion along this line will make deeper inroads into the Karluk run and reduce the catch correspondingly at the river, while the burden of conservation will fall heaviest upon operations nearest the streams.

This change in the proportion of the run caught in these two localities furthermore shows conclusively that a large part of the Karluk run comes from the north and closely follows the coast of Kodiak Island. It is not known to what extent it comes, if at all, through Kupreanof Strait or around the north end of Afognak and Shuyak Islands, for there is the possibility that the runs come in from the south and west, taking a mid-channel course and are not dispersed toward the Kodiak shore until after reaching the point in Shelikof Strait where the tides meet and cause a southward current to set along the northwest coast of Kodiak Island.

It is definitely known that the fish taken in this part of the northwestern coast of Kodiak Island are derived largely from the Karluk River runs and should, therefore, properly be included in any complete consideration of the Karluk red-salmon runs. This was conclusively shown by tagging experiments conducted in Uganik Bay in 1927.[13] No attempt has been made here, however, to consider the Karluk red-salmon run in this manner and Table 15 presents solely the catch made at the Karluk beach.

It does not seem desirable in this report to consider in detail the many interesting and significant facts that appear in the history of the Karluk red-salmon fishery. These have been discussed in the report of Gilbert and Rich, to which the reader is referred, and will be given further consideration in connection with the future intensive investigations that are being carried on. The modifications in our data are not great enough to seriously change the conclusions reached by Gilbert and Rich; in fact they make still more apparent the fact that this run has been greatly depleted. The picture presented by Table 13 is one of gradual reduction from the early period of high productivity to a level approximately half that maintained from 1888 to 1902. Until very recently there had been no material change in the laws and regulations to affect the fishing effort yet the good years were becoming less productive and the poor years were yielding constantly smaller catches. Catches in the four years from 1924 to 1927, however, were curtailed by the enforcement of a provision of the law of 1924 that wherever a weir was maintained in a salmon stream for the purpose of counting the salmon ascending to the spawning grounds, the escapement shall not be less than 50 per cent of the run. Even before this law was enacted

[13] Salmon-Tagging Experiments in Alaska, 1927 and 1928, by Willis H. Rich and Frederick G. Morton. Bulletin U. S. Bureau of Fisheries, Vol. XLV, 1929, Document No. 1057.

counts of salmon escaping into Karluk River were made. Counting began in 1921 and has been carried on each year since. Table 16 shows the commercial catch, known escapement, and known run as determined by a combination of catch and escapement. The catch here considered includes only that made at Karluk beach.

TABLE 16.—*Catch and escapement of red salmon at Karluk from 1921 to 1927*

Year	Commercial catch	Known escapement	Total known run	Year	Commercial catch	Known escapement	Total known run
1921	1,631,247	1,325,654	2,956,901	1925	1,136,508	1,620,927	2,757,435
1922	656,092	384,683	1,040,775	1926	1,825,486	2,533,412	4,358,898
1923	662,140	694,579	1,356,719	1927	398,726	872,538	1,271,264
1924	742,489	775,705	1,518,194				

OTHER SPECIES

King salmon have been taken at Karluk in every year since 1898; but since 1910 the catch has been small, falling below 1,000 in 12 seasons. The largest catch of kings at Karluk occurred in 1900 when 4,838 were taken, the smallest in 1926 when only 88 were caught. The catch statistics as shown in Table 14 indicate that the run of kings is unimportant, but by taking into consideration the number passing through the weir each season since 1921, it will be observed that the run attained significant proportions, as shown by Table 17.

TABLE 17.—*Karluk king salmon catch, 1922 to 1927*[1]

Year	Catch	Escapement	Total	Percentage of run caught	Per centage of run escaping	Year	Catch	Escapement	Total	Percentage of run caught	Percentage of run escaping
1922	661	9,572	10,233	6.27	93.73	1925	1,077	13,379	14,456	7.45	92.55
1923	1,776	14,442	16,218	10.95	89.05	1926	88	5,917	6,005	1.47	98.53
1924	294	----------	----------	----------	----------	1927	1,383	10,343	11,726	11.80	88.20

[1] No count was reported in 1924.

Kings run at Karluk early in the season and, presumably, mingle freely with the red salmon. They are caught in seines operated on the Karluk beaches just as all other salmon are taken at that fishery, yet the average escapement in each of the five years shown in Table 17 was approximately 90 per cent of the run. No explanation of this surprising situation is known. There would seem to be no reason why the present catch of this species should be materially lower than in the years preceding 1910.

Cohos were first reported from Karluk in 1897. It is not improbable that they were taken at a much earlier date but were not utilized, or were not reported separately until several years after the industry was well established there. After the peak production of 1903, 1904, and 1905, when approximately 100,000 were taken each year, the catch dropped to an average yield of about 20,000 for the last 20 years. The catch from 1906 to 1927 was remarkably uniform, there being only one exceptionally good year and one abnormally poor year in that period. There is no distinctive coho fishery at Karluk, the entire catch of cohos being strictly incidental to fishing for red salmon. It is probable that the cohos run more abundantly after the cessation of fishing at the close of the red-salmon season, so that the commercial catch as given in Table 14 forms a relatively small percentage of the total run. At any rate,

the catch gives little indication of the size of the run, a fact amply demonstrated by the count of cohos through the Karluk River weir from 1923 to 1927 as shown in Table 18.

TABLE 18.—*Karluk coho salmon run, 1923 to 1927*

Year	Catch	Escapement	Total	Percentage of run caught	Percentage of run escaping	Year	Catch	Escapement	Total	Percentage of run caught	Percentage of run escaping
1923	20,029	34,337	54,366	36.84	63.16	1926	14,013	18,254	32,267	43.43	56.57
1924	10,775	[1]				1927	14,344	18,281	32,625	43.97	56.03
1925	4,750	15,445	20,195	23.52	76.48						

[1] No count made. Weir was removed Aug. 21.

The first recorded catch of pink salmon at Karluk was made in 1901. From then until 1910, two years produced a few pinks, one year showed a yield of 233,000, while in five years no catch was reported. Beginning in 1910, however, pinks were taken each even year in considerable numbers but in negligible quantities in the odd years. (See Table 14.) This violent fluctuation is characteristic of the pink-salmon runs at Karluk, just as in many other places in Alaska.

In the early years of fishing at Karluk, pink salmon were not desired and were not canned. Untold thousands were taken in the seines with red salmon, hauled on the beaches and left there to die. It was said that at times the beaches were covered knee deep with dead pink salmon. It is also conjectural whether this tremendous waste occurred only in the first 20 years of fishing at Karluk; perhaps the practice of dumping pinks was followed in more recent years. There seems to be no other explanation of the total absence of this species in Karluk catches in some years, for in 1900 when "humpbacks came in myriads" to Red River, not one was reported at Karluk. It is probable, however, that pinks were equally abundant at both places. In the last 17 years, the fluctuations in catch of pinks has been very pronounced and show a marked 2-year cycle with heavy runs on the even years and light runs on the odd—the same as in most other localities in western Alaska. In 1916 and 1924, approximately 2,500,000 were taken while in all the other even years, except 1926, the catch reached fairly high levels.

The small run in 1926, following the heavy run of 1924, is particularly interesting since it was naturally to be expected that the enormous escapement in 1924 would have produced a large run in 1926. The run of 1926 was, however, almost as poor as the runs of the odd years; the total recorded catch of this species at Karluk was less than 90,000 and the escapement at the weir was only about 15,000. The escapement of pinks in 1924 was tremendous and, while there was no accurate count, a conservative estimate was made that it was in excess of 4,000,000. These fish all entered the stream during the later half of July and in August, and by the 21st of August so many had died that their dead bodies blocked up the weir and it was impossible to maintain it. The number of dead, spawned-out, pinks was so great that their decaying bodies apparently so polluted the water that nothing could remain in the stream and survive. Unspawned salmon of all species, salmon fry and fingerlings, trout and various small fishes were reported to have died in large numbers. The tremendous mortality is indicated by the fact that on Karluk Beach the clean bones of the dead salmon that had drifted downstream onto the beach were rolled up into solid balls by the action of the surf. It was reliably reported that the beach for miles was covered by these

remarkable aggregations of salmon bones. With such conditions existing in the river it seems quite probable that the failure of the spawning of 1924 to produce a run in 1926 may be ascribed to the fact that the same conditions that caused the death of all kinds of fish also acted unfavorably on the eggs that had been deposited. It is certain that these eggs did not survive, since comparatively few pink salmon fry were observed leaving the river in the spring of 1925. The red-salmon spawning of 1924 was also unfavorably affected as was shown by the poor run of 1929. Everything indicates, therefore, that in 1924 the spawning grounds of the Karluk were overcrowded with spawning pink salmon, and that this overcrowding was responsible for the poor run of 1926. This statement should not be taken, however, as indicating that such overcrowding is in any way a common occurrence. On the contrary, it is believed that such overcrowding is extremely rare, especially in the case of runs that are exploited commercially.

Comparatively few chum salmon are taken at Karluk. They are not regarded as a valuable fishery resource. Available records show that they have been taken in each year from 1915 to 1927, and that the largest catch was made in 1926, while none was reported before 1912.

NORTHWEST COAST OF KODIAK ISLAND DISTRICT

This district embraces the waters of Kodiak Island from Cape Uyak on the south to and including Whale Passage at the eastern end of Kupreanof Strait. The coast line is broken by several deep bays into which flow several streams used by salmon. The most noted of these is Uganik River, while on the outer coast, between Cape Ugat and Cape Kuliuk, Little River is the only conspicuous producer of salmon. The data are presented in Table 19.

The history of the Little River fishery is almost a duplication of that of Red River, and it dates back to about the same time, having begun more than 30 years ago. This is primarily a red-salmon stream, as there are no recorded catches of other species except in four years when chums and pinks were taken, the total catch for any year being less than 1,000 fish. The earliest recorded catch of salmon at Little River was made in 1897, the next in 1900, and then beginning in 1904 the fishery was continued without interruption until 1918, in which year no salmon were reported from that stream. Fishing was resumed in 1919 and carried on through the next two seasons. Following a hiatus of three years, from 1922 to 1924, small catches were made in 1925 and 1926, but 1927 was again unproductive so far as records show. The maximum catch in 1904 was reported as 246,131 fish, but as the catch in no subsequent season even remotely approached that figure, the accuracy of the number in 1904 is open to question. The average annual catch from 1900 to 1911, not including the doubtful record for 1904, was over 50,000 red salmon; but in 1912 the catch dropped to 5,583, and only once since then did it exceed 10,000. In considering this record, little doubt exists that intensive fishing at Little River between 1904 and 1911 depleted and almost destroyed its red-salmon run, until a locality that was once very productive, considering its size, was abandoned as fished out.

TABLE 19.—*Salmon catch and fishing appliances used in the northwest coast of Kodiak Island district, 1896 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Kupreanof Strait:												
1915	131		1,805		20,267							
1916	899	1,486	49,267	86	10,025							
1917	1,328	1,587	20,496	114	15,312							
1918	2,358	5,600	88,056	123	16,807							
1919	744	313	11,757	47	3,500							
1920			1,887		2,106							
1921			202		2,535							
1922		19	2,181	1	1,626							
1923	33	17	1,381		2,440							
1924				4	164							
1926	720		5,106		91							
Little River:												
1897					6,000							
1900					23,100							
1904					246,131							
1905					80,568							
1906					34,925							
1907					81,862							
1908					85,763							
1909					29,360							
1910					47,037							
1911					27,292							
1912					5,583							
1913					1,200							
1914					9,640							
1915			58		10,902							
1916					1,181							
1917					4,273							
1919		109	547		2,279							
1920					842							
1921					1,361							
1925			71		503							
1926		229	649	1	2,689							
Rocky Point:												
1923		691	2,353		17,810							
1924	572	221	11,529		14,625							
1925		3,061	8,394		4,581							
Seven Mile Beach:												
1924		37	93		1,888							
1925	330	223	293		16,490							
1926	921	2,598	15,845	5	82,101							
1927	1,043	2,945	5,656		37,718							
Shelikof Strait:												
1924	1,290	1,077	149,207	3	111,277							
1925	7	932	493		5,057							
1926	594	5,086	15,196	10	41,595							
1927	2,164	19,420	158,265	29	38,896							
Spiridon Bay:												
1916			4,162									
1917			7,326		45							
1919		935	7,038									
1923	2	733	38,922	1	398							
1925	13	59	72,727		294							
1926	12	9,752	75,651	1	64							
1927	5,745	44,103	196,698	327	2,159							
Terror Bay:												
1923			40,739									
1924		981	53,286									
1925	4	3,138	12,334		1,116							
1926		218	62,570		51							
1927	273	637	5,710		2							
Uganik Bay:												
1896					365,850							
1897					22,130							
1898					29,846							
1899					154,856							
1900					143,260							
1901					100,000							
1902					100,000							
1903					50,000							
1904					82,288							
1905					2,272							
1906					34,201							
1907					102,640							
1908					125,869							
1909					226,477							
1910			2,185		128,920							
1911			7,000		133,274							
1912	62		20,000		74,041							
1913			3,162		48,265							
1914					55,998							
1915			3,221		24,210							
1916	2,850		87,346		15,393							
1917		1,413	46,931		7,752							
1918		600	374,338		2,300							

TABLE 19.—*Salmon catch and fishing appliances used in the northwest coast of Kodiak Island district, 1896 to 1927*—Continued

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Uganik Bay—Contd.												
1919		775	2,270		10,234							
1920		26	643		5,369							
1922	1,312		15,696		1,640							
1923	2,203	2,802	61,993	30	6,698							
1924	2,284	10,252	247,956	28	4,390							
1925	1,771	32,674	94,200		4,646							
1926	9,660	33,254	961,012		274,390							
1927	24,302	89,560	798,406	769	125,715							
Ugat, Cape: 1927	1,880	6,874	16,088	19	26,957							
Uyak Bay:												
1911			12,000									
1912			6,643									
1913			7,936									
1917	40	1,681	3,198		11,146							
1918		15,794	69,459		7,824							
1919		132	231		11,959							
1920			36,180									
1921					10,511							
1922	434	30,545	317,616		2,067							
1923	721	1,316	8,526		40,647							
1924	4,597	9,972	417,751		25,587							
1925	4,881	26,932	98,327	11	160,163							
1926	10,818	44,430	1,405,906	8	228,599							
1927	7,239	55,866	673,986	146	135,388							
Viekoda Bay: 1927	2,537	5,465	65,201	349	4,924							
Zachar Bay:												
1919		3,514	3,247									
1920		628	1,976									
1922	12,000		34,525									
1924	500	6,782	130,471		77							
1925	1,230	15,319	43,562		10,692							
1926	2,699	9,226	112,581		5,605							
1927	2,213	16,209	73,346	86	2							
Unallocated: 1920	3	32	1,275		2,153							
Total:												
1896					365,850							
1897					28,130							
1898					29,846							
1899					154,856							
1900					166,360							
1901					100,000							
1902					100,000							
1903					50,000							
1904					328,419							
1905					82,840							
1906					69,126							
1907					184,502							
1908					211,632							
1909					255,837							
1910			2,185		175,957							
1911			19,000		160,566							
1912	62		26,643		79,624							
1913			11,098		49,465							
1914					65,638							
1915	131		5,084		55,379					10	600	
1916	3,749	1,486	140,775	86	26,599					8	500	
1917	1,368	4,681	77,951	114	38,528	3	400			4	300	1
1918	2,358	21,994	531,853	123	26,931	6	520					1
1919	744	5,778	25,090	47	27,972							1
1920	3	686	41,961		10,470	1	60					
1921			202		14,407							
1922	13,746	30,564	370,018	1	5,333	2	290	1	200	2	100	
1923	2,959	5,559	153,914	31	67,993	9	5,775	1	150	10	1,300	
1924	10,533	30,399	1,159,500	38	269,285	7	1,125	1	150	6	900	2
1925	8,243	83,270	330,894	11	208,599	12	1,875	1	150	23	1,180	2
1926	26,018	109,879	2,669,712	35	676,780	15	1,900			57	4,680	3
1927	49,650	260,499	2,151,621	1,754	410,657	10	2,365	2	200	94	9,125	14

NOTE.—No catch was reported in the years omitted from the several sections of the foregoing table. The unallocated catch in 1920 was made at Salmon Creek, an unidentified locality. The catch at Uganik in 1901, 1902, and 1903 was estimated and a corresponding reduction made from Karluk catches, as in those years Uganik fish were not segregated from Karluk fish.

The physical characteristics of Little River are much like those found at Karluk. The stream enters Shelikof Strait through a gravel spit which in the course of years has been thrown up by the sea across the mouth of the stream. This has caused the formation of a lagoon which covers an area of approximately one-half square mile, affording an easy fishing ground at times when operations outside the spit were stopped by heavy surf—one to be preferred at all times, and perhaps used

without scruples most of the time, as in the years of greatest production, enforcement and observance of the fishery law were almost unknown, just as they were at Red River. If fishing at Little River had always been conducted in accordance with the law of 1906, it is unlikely that a run once yielding an annual catch of over 50,000 red salmon could be literally destroyed within a decade, yet that is exactly the history of the Little River fishery. The average yield of 50,000 fish was, obviously, more than this small fishery resource could support, but one might suppose, on the basis of what is known of the productivity of other salmon runs, that the annual catch of Little River might well have been stabilized at some thirty or forty thousand.

Uganik Bay has one important red-salmon stream which is tributary to East Arm. Development of a fishery there was nearly contemporaneous with the establishment of canneries at Karluk, although the first recorded catch of salmon was made in 1896. It is known, however, that prior thereto a saltery was operated in that locality and obtained its supply of salmon from this stream. It is also known that the canneries at Afognak Bay obtained a part of their fish from bays on the northwest coast of Kodiak Island, notably Uganik, and that this district should be credited with catches as follows: 220,038 in 1889, 191,237 in 1890, and 131,250 in 1891. In accordance with that fact, it may be safely asserted that the history of the fishery began before 1890. Recognition of the value and importance of the run was manifested by the erection of a cannery at the entrance of East Arm in 1896. After the first season, packs were small, although augmented by transfer of salmon from other localities, and the plant was not reopened after 1900. Thereafter Uganik salmon were packed chiefly at Uyak and Karluk.

Red salmon from Uganik were especially valuable on account of their large size and excellent quality, and fishermen employed methods that would secure the largest catches in total disregard of any moral or legal objection to their use. Even before 1900 the stream was barricaded and efforts were directed toward maintaining a blockade that would prevent the escapement of all salmon. Evidently no concern was felt for the preservation of a valuable run of salmon. The Uganik Bay section of Table 19 shows comparatively large catches of red salmon in 1926 and 1927, which might make it appear that the stream in East Arm had again become a notable producer; but that view would be erroneous as the catches referred to were in large part taken by traps near the entrance of Uganik Bay and were a part of the Karluk run as was shown by tagging experiments conducted in 1927.[14]

No pink salmon were reported from Uganik Bay until 1910, and no large catch was made until 1916. In 1918, the catch was 374,338, but in 1920 it was only 643. In 1920 and 1921 there was little or no demand for pink salmon as the heavy packs of 1918 and 1919 had glutted the market and large surpluses were on hand. After 1922, the market for pink salmon had so far recovered from the depression of 1920 as to warrant resumption of packing generally, which explains the larger catches in late years. For the same reason, coho and chum salmon were not taken in appreciable numbers until after 1922.

The catches reported from Kupreanof Strait from 1915 and 1926 were made largely by one trap and a few gill nets set along the south shore of Raspberry Island. There are no salmon streams worthy of mention in that locality. Catches made

[14] Salmon-tagging Experiments in Alaska, 1927 and 1928. By Willis H. Rich and Frederick G. Morton. Bulletin, U. S. Bureau of Fisheries, Vol. XLV, 1929, Document No. 1057. Washington.

there came from runs to other places, along the west coast of Kodiak and Afognak Islands, and the probability is that the greater movement was toward the streams southward as far as Karluk. Especially good catches of reds and pinks were taken from 1915 to 1918, but since then the district produced few fish of any species during the period covered by this report. Since 1927 there has been renewed activity that will be treated in a future report.

The very peculiar history of the catch of red salmon in Uganik Bay is shown graphically in Figure 7. The large catches made in 1926 and 1927 have been explained above, and it is the history of the fishery from 1896 to 1920 that is of special interest. There apparently have been three periods of relative abundance separated by periods of very low productivity and ending in almost complete elimination of the commercial fishery. So far as our records show the catches were entirely comparable, but it is extremely difficult to account for such fluctuations on the assumption that we are here dealing with a single run. The periods of maximum and minimum abundance are too widely separated in time to be accounted for as ordinary cycles of abundance due to the influence of dominant age groups and the perpetuation of good and poor runs, and it seems most unlikely that such extreme yet regular fluctuations would be due to the influence of evironmental conditions. The only explanation that can be offered is that data are incomplete and that these peculiar cycles, if they may be so called, are due to differences in the conduct of the fishery. It seems probable that, as the race of Uganik red salmon declined in abundance the fishery changed and took fish from other runs, just as the fishery since 1926 has taken Karluk River fish. On the other hand the periods of apparent scarcity may have been due to a failure to properly report fish actually taken in Uganik Bay. Whatever the true explanation of these peculiarities in the record, certain facts are quite clear: The run of Uganik red salmon was originally one of considerable magnitude and value but through exhaustive fishing, probably accompanied by unlawful and destructive methods, the run has been so reduced that it is now practically worthless as a commercial fishery resource. No natural conditions such as existed at Red and Little Rivers operated in favor of the Uganik run; no ocean surf struck the Uganik beaches and storms rarely or never interrupted fishing to give the fish an opportunity to enter the stream. Everything was in favor of the fishermen. As in the case of Red River, it seems possible by adequate regulations to rehabilitate the run here to its former productivity. A counting weir has been operated in Uganik River since 1928, and the escapement, although small, seems sufficient as a basis on which the run may be built up. The course of this rehabilitation will be watched with great interest.

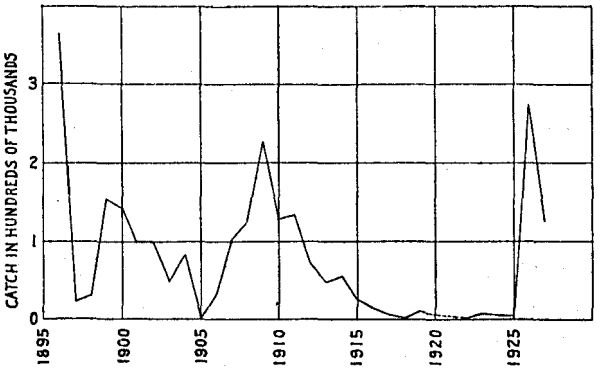

FIGURE 7.—Catch of red salmon at Uganik

Rocky Point, Seven Mile Beach, and Shelikof Strait are not localities where salmon runs are produced but merely points where salmon traveling to streams

chiefly along the northwest coast of Kodiak Island are intercepted. The only exception to this statement is that one small stream at Seven Mile Beach attracts a few salmon. Traps have been recently introduced into these waters and gill netting and beach seining at Seven Mile Beach began several years ago at the time when placer mining on the beach induced a few prospectors to settle there for several years. These men varied their activities by fishing in the summer time when the run of salmon was at its height, and sold their catches to the cannery at Uyak. Similar operations were carried on at Long Beach on the north side of the entrance to Uyak Bay where a small stream enters Shelikof Strait. The bulk of the catch here came, however, from salmon on their way to larger streams, most likely to Karluk River.

This district includes four bays which in later years have attained some distinction as important localities, due to the advent of new canneries into that region. They are Spiridon, Terror, Uyak, and Zachar Bays. Little attention was paid to fishery possibilities in these waters by the two canneries operating chiefly at Karluk, or by the one cannery at Kodiak, until 1922 when two floating canneries appeared in Uyak Bay and made surprising catches of pink salmon in Uyak and Zachar Bays. In 1923 another new cannery was opened in Uganik Bay, and the long-established companies operating at Karluk spread their activities into these heretofore neglected places, raising the catch to new levels. These increases affected pink salmon largely, although there were also sizable catches of coho and chum salmon, and a notable catch of red salmon in Uyak Bay in the last three years.

Viekoda Bay and Cape Ugat are set out as separate localities although only the record of catches here in 1927 are available. It is probable, however, that future catches will be reported from these localities, and for that reason they are here kept distinct.

The intensive fishing operations in most of these localities have been of such recent development that it is impossible to draw any detailed conclusions from the available data. It is apparent, however, that this expansion of the fishery draws primarily upon the species other than red salmon. The red-salmon resources had been fully exploited in the past, and it had been many years since every possible source of these fish was discovered and fished to, if not beyond, the limit that the supply could withstand without depletion. In this recent development of the fishery for the cheaper grades of salmon, there have been large increases in the catches of chums, cohos, and pinks, but the pink-salmon catch has greatly exceeded the others in all localities in this district. A distinct tendency is shown for the pink salmon to run more heavily in the even years, although excellent catches were made in 1927 in Uganik Bay and in the Uyak Bay (including Spiridon and Zachar Bays.) Pink salmon were unquestionably much more abundant in 1927 than in the odd years that immediately preceded, and it would appear likely that the odd-year run is building up to approximately the magnitude of the even-year runs.

The only evidence of serious depletion of salmon in any subdivision of this district is seen in the red-salmon runs at Little River and at East Arm, Uganik Bay. In the former the situation is desperate and merits immediate attention, while at Uganik there is hope that by strict observance of present regulations the fishery will survive and rebuild itself into its former proportions.

AFOGNAK ISLAND DISTRICT

This district includes the coastal waters of the north shore of Raspberry Island, all the shores of Afognak Island (except those bordering on Marmot Bay) from Afognak Village westward and northward to Tonki Cape, Shuyak Island, and all other adjacent islands.

Afognak Village, one of the oldest settlements in western Alaska, is located on the southern shore of Afognak Island, a few miles south of Afognak Bay, perhaps largely for the reason that a good red-salmon stream at the head of the bay afforded an ample supply of fish for domestic needs. Rather large catches were formerly made for such purposes. It may also be true that salmon from this stream were used commercially long before the erection of canneries in that section, but no authentic records of this are extant. It is known, however, that two canneries were built at the head of the bay in 1889 and made packs in 1889 and 1890. In 1891, these plants were not operated, but the fish which otherwise would have been taken by them from near-by streams were packed at Karluk and credited to the Afognak canneries. The pack in 1889, according to Moser, was 41,912 cases of red salmon, which, at 14 fish per case (a fair average for this region), gives a catch of 586,768 salmon. In 1890 the pack was 36,426 cases, and the computed catch was 509,964. Records show that one cannery operated in 1891, making a pack of 25,000 cases, representing a catch of approximately 350,000 salmon.

No information is available showing where these catches were made. It is safe to assume that they were not taken entirely from Afognak waters, else the production then was vastly greater than it has been in subsequent seasons. Part of the salmon canned by these plants undoubtedly came from Uganik Bay and other waters of Kodiak Islands, as many "old timers" now living at Afognak and Kodiak bear witness. Probably not more than 50 per cent of the catches in these three years came from Afognak streams and 75 per cent of that half from the streams of the west coast of Afognak, leaving the remaining 25 per cent as the catch at Afognak, Little Afognak, and Izhut Bays in the Marmot Bay district. If these rough estimates are even approximately correct, the catch in this district in 1889 was 220,000 red salmon; in 1890, 190,000; and in 1891, 130,000.

Salmon fishing was presumably carried on at Malina, Paramanof Bay, and Seal Bay long before the earliest dates recorded here, but no record of catches could be found. Malina was undoubtedly one of the important fishing grounds of the canneries located for a few years on Afognak Bay, or until the Afognak Reservation was established in 1892. From that year until 1907, the earliest year for which records are available, it seems likely that the natives of Afognak Village continued to fish at Malina and sold their catches to salters at Kodiak or salted them right at the fishing grounds for ultimate sale at Kodiak. The same situation may have existed also at Seal and Paramanof Bays. All such operations, however, were in violation of the terms of the presidential proclamation creating the Afognak Fisheries Reservation, as the right to fish in the reservation was restricted to the taking of salmon for domestic purposes only, and there are, naturally, no records of catches made during this period.

In 1911, representations were made to the Department of Commerce that the natives of Afognak Island were dependent upon these fisheries for a livelihood, and that they would suffer extreme poverty and distress if commercial fishing could not be resumed, and in April, 1912, a departmental order was promulgated opening

the reservation to commercial fishing by natives who were residents of Afognak Island conditional upon their obtaining a fishing license from a designated agent of the Government. During that year salmon were salted at Malina, Paramanof, and Seal Bays, but much of the pack was lost, due to faulty curing, and to the interruption of operations in the middle of the season by the eruption of Katmai Volcano. Most of the catch in that year went to the new cannery at Kodiak, as it did for years thereafter, or until 1921, when a cannery was built at Uzinki. Since then two more canneries were opened and now get a share of Afognak fish.

All streams in this district are small, those of Malina, Paramanof, and Seal Bays being the most important. Malina Creek empties into Shelikof Strait at a point exposed to westerly winds, which frequently interrupt fishing there, a condition that should make for a larger escapement of salmon than at the other fisheries located near the heads of bays in quiet places where similar interruptions do not occur. These fisheries have been fairly productive of red salmon, and the district as a whole shows no such evidences of serious depletion as have been observed in some other localities. It would be unreasonable, however, to suppose that there can be much increase in the productivity of these streams so far as red salmon are concerned. The spawning grounds are too limited, as the lake shores are rocky and precipitous and the tributary streams are small. The other species fare better, however, as several miles of creek beds below the lakes are open to them for spawning. The data are presented in Table 20.

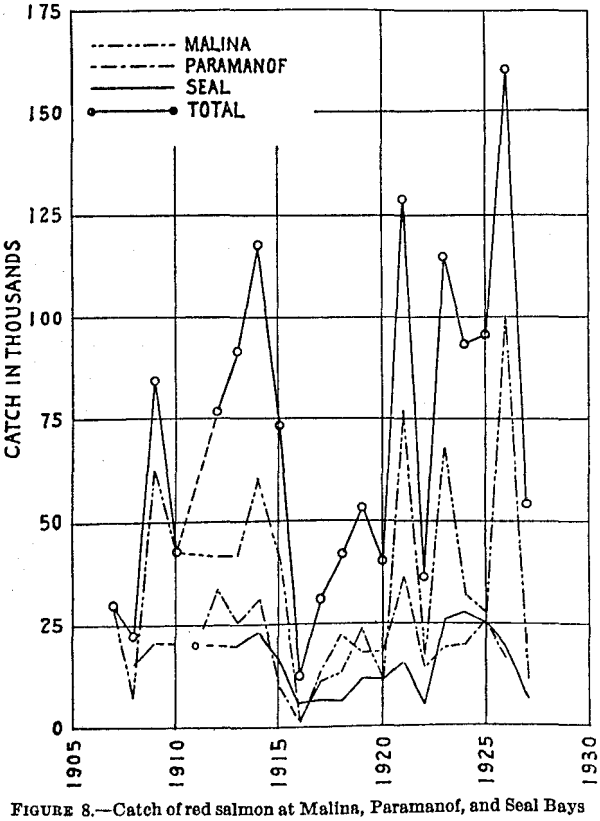

FIGURE 8.—Catch of red salmon at Malina, Paramanof, and Seal Bays

The catch of red salmon is shown graphically in Figure 8. This presents the catch in each of the three most important localities and for the entire district. There was a marked reduction in the catch in all localities during the 5-year period beginning with 1916—a condition that was in all probability due primarily to the unfavorable conditions in the spawning grounds that obtained for several years after the Katmai eruption of 1912. The fisheries have shown a remarkable recovery since 1920, however, and in recent years have been fully as productive as at any time since our records began. There have been wide fluctuations in the annual catches, but, with the exception just considered, these fluctuations appear to be due to natural causes and without special significance. There is some evidence of a cyclic change at 5-year intervals, but we have not considered it worth while to make a detailed analysis of this on account of the comparatively few years in the series that may be considered as normal.

TABLE 20.—*Salmon catch and fishing appliances used in the north and northwest coast of Afognak Island district, 1907 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Big Bay, Shuyak Island:												
1926	7,000		2,500		1,500							
1927	11,866		4,800		583							
Devils Bay:												
1923			6,149									
1926		54	4,949									
Malina:												
1907	1,800				30,000							
1908					6,860							
1909					63,240							
1910	7,200				43,285							
1912			23,311		42,906							
1913			8,410		42,136							
1914	9		19,505	150	60,314							
1915	23	15	5,424		42,347							
1916		129	1,350		2,833							
1917			1,315		11,516							
1918		3	7,247		13,899							
1919		248	1,098	22	23,037							
1920			10,995		10,728							
1921	71	191	5,923	4	77,147							
1922	2,905	82	65,366		17,123							
1923	1,328	98	19,729	15	68,381							
1924	34	376	18,269	316	32,203							
1925	3,369	241	9,701	32	28,031							
1926	4,240	623	65,766	39	100,732							
1927	4,276	1,744	25,394	200	11,879							
Paramanof Bay:												
1911					20,103							
1912	621		9,860		34,782							
1913			288		26,958							
1914			77		31,737							
1915			9,102		10,611							
1916					1,697							
1917	185		55,924		13,042							
1918		118	40,500		22,335							
1919	35	235	12,344		18,568							
1920		35	15,385		18,009							
1921		1,004	5,423	6	36,995							
1922		485	9,731	7	14,228							
1923	34	83	32,601		19,724							
1924	4	3	10,325	3	20,919							
1925	27	2,842	20,913	5	27,399							
1926	11	537	11,678	4	17,465							
1927	1,482	1,369	124,295	14	8,566							
Perenosa Bay:												
1915					549							
1927	5,627		19,183		19							
Raspberry Strait:												
1926					891							
1917					202							
1919			39		129							
1922	1,112											
1923	74	48	762		461							
1924	1,284				2,415							
1925	35											
1926	2,719	140	8,702	4	10,309							
1927	4,137	9,006	146,633	549	25,590							
Red Fox Bay:												
1925	936											
1927			15	1	178							
Seal Bay:												
1908					15,584							
1909	8,374		26,046		21,337							
1913			859		20,123							
1914	349		39,461		23,597							
1915	59		8,363		17,962							
1916	51	2	117		6,883							
1917	462		20,351		6,990							
1918	6		2	1	6,544							
1919		57	42,941	27	12,157							
1920			190		11,733							
1921			447	2	15,201							
1922			154	6	5,426							
1923	24	4	3,325		26,867							
1924	13		3,388	5	28,071							
1925	9,571		15,119	26	26,639							
1926	8,792		26,124		19,686							
1927	5,303	1	2,330	21	7,669							
Shuyak Bay:												
1913			318		3,490							
1914	1,812		610		2,987							
1915	5,344		6,191		1,838							
1916			825		331							
1923	24		4,326		407							
1924	10,025		5,024		1,127							
1925	13,704		7,850		2,909							
1926	3,986		7,840		183							
1927	2,200				130							

TABLE 20.—*Salmon catch and fishing appliances used in the north and northwest coast of Afognak Island district, 1907 to 1927*—Continued

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Shuyak Strait:												
1920			12,351		291							
Tonki Bay: 1927	3		18									
Unallocated:												
1924	38	45	3,001		8,513							
1925	961	987	4,926		11,679							
1926	5,890	898	27,707	12	12,018							
1927	121											
Total:												
1907	1,800				30,000							
1908					22,444							
1909	8,374		26,046		84,577							
1910	7,200				43,285							
1911					20,103							
1912	621		33,171		77,778	14	1,400					
1913			9,875		92,707	7	700			2	100	
1914	2,170		59,653	150	118,635	7	700			2	100	
1915	5,426	15	29,080		73,307	7	1,050					
1916	51	131	2,292		12,635	7	700					
1917	647		77,590		31,750	6	750					
1918	6	121	47,749	1	42,778	5	500					
1919	35	540	56,422	49	53,891	7	700					
1920		35	38,921		40,761	7	700					
1921	71	1,195	11,793	12	129,343	9	1,125					
1922	4,017	567	75,251	13	36,777	10	1,435					
1923	1,484	233	66,892	15	115,840	12	1,425					
1924	11,398	424	40,007	324	93,248	11	1,425					
1925	28,603	4,070	58,509	63	96,747	10	1,120					
1926	32,638	2,252	115,266	59	161,893	14	1,995					
1927	35,015	12,120	322,668	785	54,614	11	1,460					

NOTE.—The unallocated catches were reported from Afognak Island in 1925, 1926, and 1927, and from the west coast of Afognak Island in 1924.

The catch of pink salmon in this district was fairly constant from 1912 to 1925, and is remarkable in that it does not show the marked fluctuations in alternate years that are such characteristic features of pink-salmon runs throughout most of western Alaska. The record shows no definite tendency toward increased catches in either the odd or the even years, although extreme variations in this respect are found on Kodiak Island and on the mainland opposite Afognak Island. As will appear later, a similar condition exists in Marmot Bay and along the southeastern shore of Kodiak Island.

The fact that in this small restricted district no evidence is found of the 2-year cycle leads one to speculate upon the possibility of building up the "off" years in those districts where the good runs are confined to alternate years. The ultimate causes that originally established the 2-year cycle can not, of course, be known and we, at least, do not care to speculate on this, although they were unquestionably environmental and possibly associated with conditions in the sea, since conditions in fresh water are much more likely to be variable in localities as widely separated as those which show this markedly greater abundance on the even years. Whatever the cause it must have been extremely widespread, since the cycle as now known has prevailed for many years over the whole of central and western Alaska. Almost everywhere throughout this vast area there have been good runs on the even years and poor runs on the odd years, and only occasionally (as in 1927) has there been any tendency for conditions to change and bring good runs on the odd years. The fact that the pinks are exclusively 2-years old at maturity accounts, of course, for the perpetuation of the 2-year cycle once it was started and, conversely, the rigid maintenance of a 2-year cycle over a vast area and over a long period of time is corroboratory evidence of the fact that pinks are exclusively 2-year fish.

No good reason is apparent why the runs have not increased in the odd years since there are almost invariably a few pinks to be found in all streams on the odd years. It would seem probable that even a small breeding population would either build up in the course of time or would disappear entirely if the density of spawning population was below that required for effective propagation. It is possible, of course, that the meager runs on the odd years are composed of "strays" from other streams that do support good runs, but even this does not explain the maintenance of poor runs over a long period of time unless it is assumed that the breeding of the few fish found in the streams on the odd years is entirely without result. Too little is known of the habits of the pink salmon, and particularly of their "homing instinct," to justify definite conjecture; but the fact remains that the poor runs on the odd years showed no general tendency to increase until 1927.

It would appear from a consideration of the few available facts that there is no real reason why good runs may not be maintained on the odd years as well as the even. If this could be brought about, the production of pink salmon throughout the greater part of western Alaska would be practically doubled. It seems doubtful (in view of the fact that the odd-year runs have not increased in the past before they were commercially fished) that such an accomplishment can be effected solely by regulation. It would seem to require artificial propagation on a tremendous scale, aided by rigid protection, but if runs could be established on the odd years their value would well repay the effort. The possibility of doing this depends, however, upon the extent to which the pinks return to their parent streams, a matter that is now under investigation. Once this question is settled, if favorable, consideration might well be given to the opportunity here presented of enormously increasing the productivity of a large area.

This district has never produced many chums or kings, the largest catches of both species having been made in 1927, the last year considered in this report. The catch of cohos was irregular and small up to 1924, but in that year and each subsequent year good catches have been made, an increase that was doubtless due to increased intensity of fishing.

Viewing the district as a whole, a notable increase in the catch of all species has come about in the last seven years, yet that is not in itself evidence that the runs are increasing and that the supply of salmon is larger than ever before. It is much more likely due to the fact that greater efforts are being made to catch the salmon. On the other hand there is no evidence that the salmon runs in this district have been depleted, but it must be borne in mind that small streams, such as these, can be easily overfished and a run of salmon depleted in a few years. The development of the fishery should be carefully watched, and fishing operations should have close supervision if disastrous consequences are to be averted.

MARMOT BAY DISTRICT

The Marmot Bay district embraces Marmot Bay, its several arms indenting the southern shore of Afognak Island from Tonki Cape on the east to the narrows between Afognak and Whale Islands on the west; the eastern part of Whale Island; and all waters along the north shore of Kodiak Island from Karluk Strait eastward to Uzinki Narrows and North Cape on Spruce Island, with all adjacent islands.

TABLE 21.—*Salmon catch and fishing appliances used in the Marmot Bay district, 1904 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Afognak Bay:												
1918	3,470		910		836							
1919	5,203											
1920	6,854				7							
1921	4,197											
1922	18,034				117							
1923	15,018	1	354	28	758							
1924	10,766											
1925	6,456											
1926	9,309		5	2	90							
1927	4,064		486		2							
Anton Bay: 1927	43	2,586	88,217	5	9							
Camel Rock:												
1926	1,429	3,935	15,804		23							
1927	189	1,057	39,879	2	7							
Danger Bay:												
1912	327											
1913	1,146		20,818		451							
1914			2,812		72							
1915	3		4,075		14							
1916	4,194		1,345									
1917	1,556		22,581		184							
1918	1,012											
1919			5,871		27							
1920	840											
1922	2,777		16,680		14							
1923	2,225		40,177									
1924	4,950											
1925	3,721		6,935		76							
1926	1,117	384	5,113		23							
1927	3,569	29	2,163		5							
Doctor Bay:												
1916			6,893									
1922	995	1	32,388		29							
1923	588	539	68,241		59							
1924	910	346	97,905									
1925	168	1,520	54,203		44							
1926	57	981	1,098		2							
1927		325	4,177	2								
Izhut Bay:												
1910					11,957							
1912	165				195							
1913			15,793		3,188							
1914			940		3,426							
1915			9,130		1,216							
1916	998											
1917			6,910		17,638							
1919					1,973							
1920					3,364							
1921	1	5	2	2	2,771							
1923	544		233		13,720							
1924	25	6	4,580	3	8,174							
1925	276			11	8,639							
1926	547		146		574							
1927	917				129							
Kizhuyak Bay:												
1904					9,842							
1907	1,892				36,341							
1908	14,500				31,804							
1909	5,550				19,079							
1910	3,065				29,196							
1911					17,319							
1912			21,445		23,341							
1913			146,804									
1914			3,101		2,149							
1915		12	266		7							
1918			14,880									
1923	7	11	9,673	1	722							
1924	1,785	32	2,081		68							
1925	1,258	2	13,751		1,353							
1926	2	5,504	28,764		10							
1927	907	2,638	67,670		74							
Lena Bay: 1927		1,563	3,213		4							
Little Afognak Bay:												
1909	12,270				16,603							
1912	2,024		438		7,281							
1913	4,150		1,443		8,673							
1914	2,422				7,266							
1915	5,876		5,393		10,702							
1916	16,024		2,658	2	34,898							
1917	1,496		261		22,157							
1918	1,881		23,042		7,884							
1919	5,179	119	2,112		23,335							
1920	5,128		34,374		8,584							
1921	1,867	3	97	8	41,329							
1922	11,609		2,141	17	5,241							
1923	5,161		434	3	17,411							
1924	20,922		5,237	148	12,689							

TABLE 21.—*Salmon catch and fishing appliances used in the Marmot Bay district, 1904 to 1927—Con.*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Little Afognak Bay—Con.												
1925	1,613		111		5,893							
1926	9,778	1	1,492	23	4,866							
1927	9,552		80	5	159							
Unallocated:												
1923	123				90							
1926		15										
Total:												
1904					9,842							
1907	1,892				36,341							
1908	14,500				31,804							
1909	17,820				35,682							
1910	3,065				41,153							
1911					17,319							
1912	2,516		21,883		30,817	6	600					
1913	5,296		184,858		12,312	3	300			2	100	
1914	2,422		6,853		12,913	3	300			2	100	
1915	5,879	12	18,864		11,939	3	450					
1916	21,216		10,896	2	34,898	4	400					
1917	3,052		29,752		39,979	2	250					
1918	6,363		38,832		8,720	1	100					
1919	10,382	119	7,983		25,335	3	300					
1920	12,822		34,374		11,955	3	300					
1921	6,065	8	99	10	44,100	4	500					
1922	33,415	1	51,209	17	5,401	9	1,285			9	720	
1923	23,666	551	83,259	32	32,760	9	975					
1924	39,358	384	109,803	151	20,931	6	775					
1925	13,492	1,522	75,000	11	16,005	4	550					
1926	22,239	10,820	52,422	25	5,588	7	945					
1927	19,241	8,198	205,885	14	389	6	680					

NOTE.—No catch reported in the years omitted from this table. The unallocated catch in 1923 was 123 cohos from Spruce Island and 90 reds from Wooded Islet; in 1926, it was 15 chums from Whale Island.

In our discussion of catch statistics for the Afognak Island district mention was made of the pack of two canneries on Afognak Bay in the three years of their operation, and it was shown that on the basis of 14 fish per case, the catch of red salmon was as follows: 586,768 in 1889, 509,964 in 1890, and 350,000 in 1891. As there explained, this entire catch certainly was not taken from Afognak waters, and we allocated to Marmot Bay 25 per cent of the totals, which were as follows: 146,692 in 1889, 127,490 in 1890, and 87,500 in 1891. They are not shown in the table because of the unsatisfactory nature of the allocation we have had to make.

As already explained in another section of this review, Afognak Island with its adjacent waters was made a reservation by presidential proclamation in 1892, primarily for fishery purposes. For 20 years commercial fishing was forbidden, but in March, 1912, the reservation was opened to commercial fishing by the natives and whites married to native women, who were making their homes on Afognak and Spruce Islands at that time. During these intervening years, commercial fishing was not entirely discontinued, although by the terms of the proclamation it was prohibited. No record of catches made in that period was obtainable, except in 1909 for Little Afognak Bay and in 1910 for Izhut Bay. It was known, however, that the Alaska Commercial Co., through its Kodiak station, operated a saltery at Izhut Bay before 1912 and took salmon from other Afognak streams several years before the reservation was opened. Except as already noted, these catches were either not reported or were shown as coming from other localities.

The eruption of Katmai Volcano in 1912 affected the runs of salmon in this district, as it did in the districts which include the north and northwest shores of Kodiak and Afognak Islands. The catches in that year, and several subsequent seasons, are not a true index of the productivity of the streams of this district. Runs were erratic and fishing was spasmodic; and to these conditions may be due in large part the very noticeable fluctuations in catches at the different localities in that period.

Afognak Bay was not opened to commercial fishing in 1912, but in 1918 restrictions in respect to cohos were removed, and since then fishing for that species has been permitted each year. Small catches of cohos at Katanie in 1920 and 1924 and at Markwa Bay in 1922 are included in the Afognak Bay catch for those years.

Danger Bay and Doctor Bay are producers of pink salmon chiefly, and in both localities there is a marked decline in the catch, which appears to be evidence of depletion.

Little Afognak has been a consistently fair producer of coho and red salmon, and in two years good catches of pink were made. The catch of red salmon in 1927, however, dropped to the lowest point it has reached in the recorded history of the fishery, only 159 fish being taken, and it would appear that this run is almost destroyed.

The situation at Izhut Bay, which is primarily a producer of red salmon, is essentially the same. In 18 years, from 1910 to 1927, 4 years were without recorded catch and in 3 the catch was less than 600 red salmon, 1926 and 1927 being among these. The future of this fishery is uncertain, as it seems possible that the run may not survive commercially.

Kizhuyak Bay has interesting peculiarities, in that prior to 1912 only coho and red salmon were reported as coming from that locality. In the 12 years 1911 to 1922 not a coho was taken and the catch of reds dropped from 23,341 in 1912 to an average of only a few hundred in recent years. Another peculiarity about Kizhuyak Bay is that no pinks were reported taken there until about 1911. Since then, however, pinks have constituted a large percentage of the total catch. What was once a red and coho stream has become, therefore, almost exclusively a producer of pink and chum salmon.

New localities of promise in this district are Anton Bay and Camel Rock, both of which yielded a fair number of pinks in 1927.

The district as a whole shows a precarious condition in respect to red salmon, a downward trend in production of cohos, and a definite increase in the catch of pinks and, to a lesser extent, of chums. Fishing is much more intensive than it was 10 years ago, owing to the opening of four new canneries in the district, and the fishing grounds are, with few exceptions, in quiet harbors, so that the runs of salmon are pursued more zealously and successfully than may be considered in keeping with their conservation. The fisheries here are quite local in their nature and apparently do not draw to any appreciable extent upon passing runs. This feature makes it quite probable that such intensive fishing as is now being conducted may be followed by depletion.

EAST COAST OF KODIAK ISLAND DISTRICT

The east coast of Kodiak Island district embraces the coastal waters of the east, south, and west shores of Spruce Island and of the east shore of Kodiak Island from Uzinki Narrows on the north to Cape Trinity on the south, including all adjacent islands. It has no outstanding fishery such as is found on the west coast of the island. It has, however, four localities that may be regarded as fairly important, although the runs of salmon are subject to considerable fluctuation without apparent relation to the life cycle of the different species. They are Chiniak Bay and its arms, Ugak Bay, Kiliuda Bay, and Sitkalidak Strait.

During the summer of 1888 the steamer *Albatross*, while engaged in explorations off the coast of Alaska, visited all the larger bays indenting the eastern shore of Kodiak Island and inquiries were made concerning the salmon fisheries in many

localities.[15] It was learned that good runs occurred at Three Saints Bay, at Old Harbor in Sitkalidak Strait, and at Port Hobron on the north coast of Sitkalidak Island, but no mention was made of the kind or quantity of salmon obtainable in these localities. It was also reported that a saltery was in operation at Port Hobron in 1888, and that at the time of the visit of the *Albatross* party 400 barrels had been packed. No other statistical data concerning this entire district appear in the reports of the *Albatross* investigations in 1888 or 1890.

Table 22 gives the salmon catches in this district from 1894 to 1927.

Uzinki Bay, the body of water separating Spruce Island from Kodiak Island, at the head of which is located the village of Uzinki, has been a small producer of all species of salmon. The first recorded catch was 33 cohos in 1914. Beginning in 1915, the fishing resulted in a catch of 2,461 pinks, to be followed in other years by larger catches until the maximum of 35,061 was reached in 1924. Thereafter the decline was rapid, as the catch almost reached the vanishing point in 1927—only 340 pinks being caught that year. It is not known to what extent this decline was due to decreased fishing effort or to a real scarcity of salmon, but with two canneries now located at Uzinki it would be logical to expect the fishing effort to increase. It is known, of course, that the streams tributary to Uzinki Bay are few and very small. The largest one empties at the village and drains the north end of Spruce Island, while none of any consequence comes from the Kodiak side of the bay. Although considerable catches have been made occasionally in these waters it is not likely that they were taken from runs to local streams, but rather that they came from runs passing through Uzinki Bay and Narrows to other districts.

TABLE 22.—*Salmon catch and fishing appliances used in the east coast of Kodiak Island district, 1894 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Barling Bay:												
1926	1,181	13,113	74,988	3	213							
1927		50	3,842									
Buskin River:												
1907	8,334				6,146							
1909	4,411				5,554							
1910	2,777				14,336							
1911	4,138				2,066							
1913			387	50	154							
1922			35,765		350							
1923		51	72,509		2,736							
1924	494		11,775		926							
1925	2,500	11	45,814		4,542							
1926	11,047	7,173	73,520	19	1,312							
1927	159	815	4,629		397							
Chiniak Bay:												
1908	3,037		25,926		11,997							
1927		22	2,212		3,015							
Kaguyak Bay:												
1896					4,160							
1915					1,152							
1924	3,121	1,139	9,218		753							
1926	2,425		375		3,543							
1927	1,478											
Kalsin Bay:												
1911	2,133											
1919			44,581									
1922			76,864									
1923			8,433									
1924			16,435									
1925			146,112	1	1							
1926			40,140									
1927		7	22,742									

[15] Explorations of the Fishing Grounds of Alaska, Washington Territory, and Oregon during 1888 by the U. S. Fish Commission steamer *Albatross*. By Z. L. Tanner and others. Bulletin, U. S. Fish Commission for 1888, Vol. VIII, 1890. Washington.

TABLE 22.—*Salmon catch and fishing appliances used in the east coast of Kodiak Island district, 1894 to 1927*—Continued

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Kiliuda Bay:												
1900					4,900							
1912			46,319		12,810							
1913			58,614		22,473							
1914		574	36,952	130	15,247							
1915		777	32,812		12,850							
1916	14	718	228,948	13	10,022							
1917	720	1,754	8,434	41	5,558							
1918		1,420	53,245	35	4,579							
1919	47	5,695	32,308	274	9,557							
1920		117	101,881		16,620							
1921					11,200							
1922	192	1,579	42,975		17,276							
1923	392	304	14,487	61	11,870							
1924	4,006	13,021	538,281	20	9,979							
1925	58	27,802	438,421		878							
1926	7,198	9,808	164,034		1,109							
1927	808	9,251	288,536		27							
Middle Bay:												
1924			14,914									
1925		5	86,730	1	157							
Monks Bay:												
1922			491									
1924	569											
1925	344											
1926	1,321				5							
1927	203				2							
Russian Harbor:												
1925					1,873							
1927	1,336											
Shearwater Bay:												
1926	3		14,846		5							
1927			24,655									
Sitkalidak Strait:												
1917	926	446										
1918		1,638	148,916									
1919		4,383	30,881									
1920	70	8,462	204,169									
1922	12,190	73,952	286,313	11	6,070							
1923	19	8,089	222,083		618							
1924	96	1,610	76,200	112	820							
1925	4,477	25,464	317,293	16	4,576							
1926	12,396	45,976	234,569	4	1,564							
1927	6,152	13,010	415,376	29	1,379							
St. Paul Harbor:												
1920			108,426		50							
1921			22,257		283							
Sycamore Bay:												
1922			11,175									
1923					2,650							
1925		1	9,173		1							
Ugak Bay:												
1894					120,000							
1897					36,960							
1900					4,000							
1907					25,640							
1908	7,225				26,703							
1909	6,780		15,380		55,200							
1910			37,679		55,814							
1911					32,621							
1912	357		18,109		32,261							
1913	2,262		34,043		31,183							
1914	2,226		17,913	163	89,245							
1915	2,319		21,602	147	27,886							
1916	3,225	52	117,885	373	5,357							
1917	127		8,871	552	7,396							
1919		214	18,584	80	4,841							
1920			15,427		9,266							
1921					31,275							
1922	178	62	52,924		7,983							
1923	517	8	557		16,583							
1924		7	8,288	48	20,535							
1925			6,643	721	12,162							
1926			58,094	284	4,045							
1927			78	97	2,112							
Uzinki Bay:												
1914	33											
1915			2,461									
1916	215		8,254									
1917			11,204									
1918			13,546									
1919		776	7,619									
1920	1,864	4	25,879									
1922		34	7,014									
1923	405	47	6,657		233							
1924	1,689	45	35,061	15	371							
1925	97	285	18,566	1	20							
1926	2,512	886	7,323		198							
1927	444	59	340		6							

TABLE 22.—*Salmon catch and fishing appliances used in the east coast of Kodiak Island district, 1894 to 1927*—Continued

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Womens Bay:												
1911	2,259											
1912	1,017		11,306		378							
1913			80,546		49							
1914			2,632		46							
1915		59			1,172							
1916			2,506		1,540							
1917			5,974									
1918		163	34,093									
1919			6,978									
1922	924		37,934									
1923	263		305		2							
1926	1,330		26,905		652							
1927		778	52,157	1								
Unallocated:												
1908	12,000				70,705							
1910			16,141									
1911	319											
1915	50		3,009		192							
1918		570	74,400									
1925		10	296									
1926				7								
Total:												
1894					120,000							
1896					4,160							
1897					36,960							
1900					8,900							
1907	8,334				31,786	12	590					
1908	22,262		35,926		109,405	11	640					
1909	11,191		15,380		60,754	20	2,140					
1910	2,777		53,820		70,150	18	2,150					
1911	8,849				35,587	10	1,375					
1912	1,374		75,734		45,449	9	905			5	300	
1913	2,262		173,590	50	53,859	9	900	1	100	6	400	
1914	2,259	574	57,497	293	104,538	7	900			6	400	
1915	2,369	836	59,884	147	43,252	6	1,010			7	515	
1916	3,454	770	357,593	386	16,919	2	400			6	420	
1917	1,773	2,200	34,483	593	12,954	7	1,000			8	560	
1918		3,791	324,200	35	4,579	10	1,040	2	400	8	360	
1919	47	11,068	140,951	354	14,398	7	900	1	250	10	600	
1920	1,934	8,583	455,782		25,936	8	1,000	1	200	12	720	1
1921			22,257		42,758	12	1,570	1	200	16	810	
1922	13,484	75,627	551,455	11	31,679	21	3,000	1	200	31	2,360	1
1923	1,596	8,499	325,031	61	34,692	18	2,275			11	650	1
1924	9,975	15,822	710,172	195	33,384	13	1,775			2	150	2
1925	7,476	53,578	1,069,048	740	24,210	21	2,425			2	150	3
1926	39,413	76,956	694,794	317	12,646	20	2,405			7	400	4
1927	10,580	23,982	814,567	129	6,938	11	1,450			8	528	3
Chinlak Bay, total:												
1907	8,334				6,146							
1908	3,037		25,926		11,997							
1909	4,411				5,554							
1910	2,777				14,336							
1911	8,530				2,966							
1912	1,017		11,306		378							
1913			80,933	50	203							
1914			2,652		46							
1915		59			1,172							
1916			2,506		1,540							
1917			5,974									
1918		163	34,093									
1919			51,559									
1920			108,426		50							
1921			22,257		283							
1922	924		150,563		350							
1923	263	51	81,247		2,738							
1924	494		43,124		926							
1925	2,500	16	278,656	2	4,700							
1926	12,377	7,173	140,565									
1927	159	1,622	81,740	3	3,412							

NOTE.—No catch reported in the years not shown in any section of this table. Catches at Newman Bay and Three Saints Bay are added to catch at Sitkalidak Strait; catches at Eagle Harbor and Portage Bay are counted as Ugak Bay salmon; catch at Nelsons Cove is counted as Uzinki Bay salmon. The unallocated catches were taken at the following places: Gibson Bay in 1911 and 1926; Humpback Bay in 1915; Kasakofsky Bay in 1908; Kodiak in 1908, 1910, and 1918; Shafka Cove in 1911; and Soldiers River in 1925.

Monks Bay, on the southern shore of Spruce Island, has produced a few salmon in recent years, mostly cohos. The stream is small and has no present or potential importance.

Sycamore Bay, or Matanaska Bay as it is known locally, indents the northeast shore of Kodiak Island about midway between Kodiak and Uzinki. It is shown as a producer of a few thousand pink salmon in 1922 and 1925, and 2,650 red salmon in 1923. This reported catch of red salmon is open to question, or else the movement of salmon in that year was most peculiar. Aside from one red taken in 1925, none was caught in this bay before or after 1923. This supports the view that the catch of that year was probably erroneously shown as Sycamore Bay fish. The streams at the head of the bay are small, yet appear to be large enough to support a much larger run of pinks, cohos, and chums than has been reported.

Chiniak Bay includes Buskin River, Kalsin Bay, Middle Bay, Womens Bay (sometimes called English Bay), and St. Paul Harbor. It is largely a producer of pink salmon, the catches of this species being exceeded in only two other localities on the east coast of Kodiak Island—Kiliuda Bay and Sitkalidak Strait. It is interesting to note that the fisheries in these localities have shown their greatest development within the last 10 years.

The red-salmon catches in this locality have been very uncertain, never large, and frequently none at all, but such as they were the greater part was taken at Buskin River. In late years this locality has produced noticeably fewer red salmon than it did 15 years earlier. There was a period of extremely unproductive years from 1912 to 1922, three of which show no catch. This total absence of red salmon may have been due to the smothering of any spawn deposited in Buskin Lake and tributaries in 1912 and the next two years, on account of the heavy fall of volcanic ash in that region which seriously affected the spawning grounds of red salmon. Since 1922 there has been a distinct increase in the catch. Buskin River has also been the chief producer of coho salmon in this locality and the fluctuation in catch is strikingly similar to that of reds, though there were nine wholly unproductive years from 1913 to 1921, inclusive.

No pinks were reported from Kalsin Bay before 1919, none from Middle Bay until 1924, and none from St. Paul Harbor (known also as the village of Kodiak) before 1920, when 108,426 were credited to that place. A small stream enters the bay at this point, which in some years has attracted a few salmon, but the probability is remote that this catch was taken entirely at St. Paul Harbor. More than likely the greater part of it came from other points on the bay.

The final section of the statistical table for the east coast of Kodiak Island district shows the total catch of salmon in the Chiniak Bay area, which is a combination of catches at St. Paul Harbor, Buskin River, Womens Bay, Middle Bay, Kalsin Bay, and Chiniak Bay. The catches of reds and cohos come chiefly from Buskin River and have been discussed above. The catches of pinks in the whole Chiniak Bay area from 1912 to 1927 are shown graphically in Table 23. There has been a remarkable increase in the catches since 1916, which is doubtless due to increased activity. It is interesting to note that there is no definite 2-year cycle established and that the fluctuations while marked are irregular. This condition has been mentioned above in the discussion of the pink-salmon runs of Afognak Island and Marmot Bay.

The earliest recorded catch of salmon along the east coast of Kodiak Island was at Eagle Harbor, Ugak Bay, in 1894, when 2,000 barrels of red salmon were pickled, representing an estimated catch of 120,000 fish. Three years later a pack of 616 barrels of reds was reported, which, at an average of 60 fish per barrel, shows a catch of 37,000 fish; and in 1900, six years later, the known catch was only 4,000 reds, all of

which were packed at Karluk and Uganik. Nothing more is known of operations at Ugak Bay until 1907, yet it seems likely that fishing was carried on each year through the seasons for which statistics are not available. Beginning in 1907, records are available for each year to and including 1927, except 1918, when for unknown reasons no salmon were reported from Ugak Bay. The catch of red salmon is shown graphically in Table 24. The period from 1907 to 1915 was fairly productive, but was followed by a number of years when the reported catch was negligible. Then followed a period of slightly increased productivity from 1921 to 1925, while the catches in 1926 and 1927 were again very poor. The general picture is one of marked depletion.

TABLE 23.—*Graphic table of catches of pink salmon in the Chiniak Bay area*

[Each letter represents a catch of 10,000 fish except that fractional parts of this unit catch are considered as full units]

Year	Catch
1912	CC
1913	CCCCCCCCC
1914	C
1915	
1916	C
1917	C
1918	CCCC
1919	CCCCCC
1920	CCCCCCCCCCC
1921	CCC
1922	CCCCCCCCCCCCCCC
1923	CCCCCCCCC
1924	CCCCC
1925	CCCCCCCCCCCCCCCCCCCCCCCCCCC
1926	CCCCCCCCCCCCCC
1927	CCCCCCCCC

TABLE 24.—*Graphic table of catches of red salmon in the Ugak Bay area*

[Each letter represents 2,000 fish]

Year	Catch
1907	UUUUUUUUUUUUU
1908	UUUUUUUUUUUUUU
1909	UUUUUUUUUUUUUUUUUUUUUUUUUUUU
1910	UUUUUUUUUUUUUUUUUUUUUUUUUUUU
1911	UUUUUUUUUUUUUUUUU
1912	UUUUUUUUUUUUUUUUU
1913	UUUUUUUUUUUUUUUU
1914	UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
1915	UUUUUUUUUUUUUU
1916	UUU
1917	UUUU
1918	
1919	UUU
1920	UUUUU
1921	UUUUUUUUUUUUUUUU
1922	UUUU
1923	UUUUUUUUU
1924	UUUUUUUUUUU
1925	UUUUUUU
1926	UUU
1927	UU

In respect to other species taken at Ugak Bay, statistics show that since 1916 the catch of cohos has been much lower than in the earlier years. None has been reported since 1923, and it would appear that either the run has been completely destroyed or there is no fishing for this species. Pink salmon are taken at Ugak Bay in varying quantities. The largest catch on record was made in 1916 when 117,885 were taken. Since then, 1922 and 1926 were moderately good years, but in 1927 the catch was only 78. The number of king salmon taken here has been surprisingly large in some seasons, considering the size of the stream, though in many years none was taken. There

is no way of accounting for these spasmodic appearances of king salmon, yet this bay alone produced 65 per cent of the entire take of kings from the east coast of Kodiak Island district. The catch of chums has always been negligible.

Shearwater Bay, an arm of Kiliuda Bay, produced a small number of pink salmon in 1926 and 1927. This locality is shown in the table, but the catches have not been included in Kiliuda Bay figures in the table nor in the discussion given below.

The first recorded catch of salmon at Kiliuda Bay was made in 1900, when 4,900 red salmon were taken and packed at the Uganik Cannery. Evidently no further commercial fishing at Kiliuda Bay was attempted until after the establishment of a cannery at Kodiak. Since then, fishing has gone on annually through 1927, the end of the period here considered. In the total production of red salmon, it is second only to Ugak Bay, whereas it leads in the number of pinks produced by reason of its earlier exploitation. Since 1918, Sitkalidak Strait has outdistanced all other localities in this district in the yield of pinks and chums. That fact may be accounted for, in part at least, by the use of traps, while in the other localities the fishing has been almost wholly by movable appliances, chiefly senies.

The trend of the red-salmon fishery at Kiliuda has been downward, as shown graphically in Table 25. If the catch of 27 reds in 1927 is a true showing of the condition of that fishery, the run is virtually extinct. However, the run has been subject to considerable fluctuation in the 16 years for which we have records, and it may be that the poor catches of 1925 to 1927 will be followed by another period of greater abundance.

Fishing at Kiliuda Bay, as at most all other localities on the east coast of Kodiak Island, until quite recent years at least, had been largely by means of beach seines. In 1927, and perhaps in the two years immediately preceding, one trap was operated in the bay, but it was not the cause of the depletion of the reds for the catch in these three years was very small. Depletion had resulted before the introduction of traps in these waters.

The larger catches of pinks and chums from 1924 to 1927 is beyond question the direct result of trap fishing. Except in 1916 and 1920, the catch had not exceeded 100,000 pinks until 1924, when more than half a million were caught, with smaller yet substantial catches in the next three years. Another singular fact in this connection is that these salmon do not run alternately heavy and light in the even and odd years. The odd years are as productive as even years at Kiliuda Bay, and in this respect resemble the runs of Afognak Island.

TABLE 25.—*Graphic table of catches of red salmon in Kiliuda Bay*

[Each letter represents 1,000 fish]

Year	Catch
1912	KKKKKKKKKKKKK
1913	KKKKKKKKKKKKKKKKKKKKKKK
1914	KKKKKKKKKKKKKKKKK
1915	KKKKKKKKKKK
1917	KKKKKK
1918	KKKKK
1919	KKKKKKKKKK
1920	KKKKKKKKKKKKKKKKK
1921	KKKKKKKKKKKK
1922	KKKKKKKKKKKKKKKKKK
1923	KKKKKKKKKKK
1924	KKKKKKKKK
1925	K
1926	KK
1927	K

Sitkalidak Strait embraces a fishing area of more recent development than any other in this district, and it has become an outstanding producer of pink salmon, due chiefly to the introduction of traps. The first recorded catch of salmon in these waters was in 1917, when 926 cohos and 446 chums were taken. Beginning in 1918 with a catch of 148,916 pink salmon, the catch of that species has been consistently high. Omitting 1921, when no fishing was done, it has fallen below 200,000 only twice—in 1919 and 1924—while in 1927 it reached the surprising total of 415,376. The development of this fishery is shown graphically in Table 26. Barling Bay, lately so named, is tributary to Sitkalidak Strait, and its yield of salmon rightly should be considered as a part of the Sitkalidak Strait catch, but it is shown separately in the table for future consideration in event a fishery of larger proportions develops at that point. By adding the Barling Bay catch in 1926 to the Sitkalidak Strait catch for that year, we have a total of 309,557, which is only 7,736 below the catch in 1925. It is apparent that here also, as elsewhere in the east coast of Kodiak Island district, there is no significant difference in the productivity of odd and even years.

The Sitkalidak area contains no stream of unusual size or character which would make it more attractive to chums and pinks than the streams in other bays on this coast, but the catch with two exceptions has been consistently good. It is possible that Cook Inlet and Prince William Sound runs strike the Kodiak coast at Sitkalidak Strait and Kiliuda Bay, and are intercepted at these points, but there is no definite evidence that such is the case.

TABLE 26.—*Graphic table of catches of pink salmon in Sitkalidak Strait*

[Each letter represents 10,000 fish]

Year	Catch
1918	SSSSSSSSSSSSSS
1919	SSSS
1920	SSSSSSSSSSSSSSSSSSS
1921	
1922	SSSSSSSSSSSSSSSSSSSSSSSSSSSS
1923	SSSSSSSSSSSSSSSSSSSS
1924	SSSSSSSS
1925	SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS
1926	SSSSSSSSSSSSSSSSSSSSS
1927	SSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSSS

Kaguyak Bay, first fished in 1896, was abandoned until 1915, when a small catch of reds was made and was not again fished until 1924. The catches recorded as from Kaguyak probably include fish caught not only in Kaguyak Bay proper but at Kiavak and other bays between Sitkalidak Island and Kaguyak.

Considering the east coast of Kodiak Island as a whole, it is found that the catch of king salmon has been unimportant, and that those of cohos and chums have fluctuated rather widely but without showing any marked trend. The red-salmon catches, as shown graphically in Table 27, show a definite decrease which may safely be ascribed to the depletion of the small runs originating chiefly in Ugak Bay, Chiniak Bay, and Buskin River. The pink-salmon catches, however, show a definite upward trend throughout the district (see Table 28), which is due in part to the development of a trap fishery. The contrasting pictures presented by the red and pink salmon catches in this district are interesting and suggestive and are typical of a fishery in which one more valuable species is being depleted and its place taken by a less valuable species. The pink salmon show no striking difference

in abundance in alternate years. In this regard they differ from the runs on the mainland and on the northern and western shores of Kodiak Island and resemble the runs on Afognak Island.

TABLE 27.—*Graphic table of catches of red salmon in the east coast of Kodiak Island district, 1907–1927*

[Each letter represents 2,500 fish]

Year	Catch
1907	RRRRRRRRRRRR
1908	RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
1909	RRRRRRRRRRRRRRRRRRRRRRRR
1910	RRRRRRRRRRRRRRRRRRRRRRRRRRRR
1911	RRRRRRRRRRRRRR
1912	RRRRRRRRRRRRRRRRRR
1913	RRRRRRRRRRRRRRRRRRRRR
1914	RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR
1915	RRRRRRRRRRRRRRRRRR
1916	RRRRRRR
1917	RRRRRR
1918	RR
1919	RRRRRR
1920	RRRRRRRRRRR
1921	RRRRRRRRRRRRRRRR
1922	RRRRRRRRR
1923	RRRRRRRRRRRRR
1924	RRRRRRRRRRRRRR
1925	RRRRRRRRRR
1926	RRRRRR
1927	RRR

TABLE 28.—*Graphic table of catches of pink salmon in the east coast of Kodiak Island district*

[Each letter represents 20,000 fish]

Year	Catch
1908	PP
1909	P
1910	PPP
1911	
1912	PPPP
1913	PPPPPPPPP
1914	PPP
1915	PPP
1916	PPPPPPPPPPPPPPPPPP
1917	PP
1918	PPPPPPPPPPPPPPPPP
1919	PPPPPPPP
1920	PPPPPPPPPPPPPPPPPPPPPP
1921	PP
1922	PPPPPPPPPPPPPPPPPPPPPPPPPP
1923	PPPPPPPPPPPPPPPPPP
1924	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
1925	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
1926	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
1927	PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP

COOK INLET DISTRICT

The Cook Inlet district embraces all coastal waters inside, or northerly, of a line from Cape Douglas to Cape Elizabeth. (See fig. 9.) Except for several bays in the southern part the shore line is unusually smooth and without indentations of consequence until the inlet divides at its northern end into Turnagain Arm and Knik Arm. The shore from Anchor Point to East Foreland is abrupt and is broken only by two rivers, the Kasilof and the Kenai, both of which are the outlets of large lakes, and a few much smaller streams. From East Foreland to Point Possession, the shore is less abrupt but is strewn with bowlders. There are no important streams entering the inlet in this region. Turnagain Arm has several tributary streams, but not all of them appear to be suitable for the spawning of salmon. Knik Arm is the outlet of Knik and Matanuska Rivers, and several smaller streams, most of

which produce some salmon. On the west side of the inlet from Point Mackenzie to West Foreland are found the largest rivers of the district, the Susitna and Little Susitna Rivers, and several lesser streams, among which may be named Beluga, Theodore, Chuit, and Nikolai Rivers and Three Mile Creek. The shore in this section of the inlet is low and consists of wide mud flats except in the vicinity of North Foreland. These same characteristics of shore and beach are found south

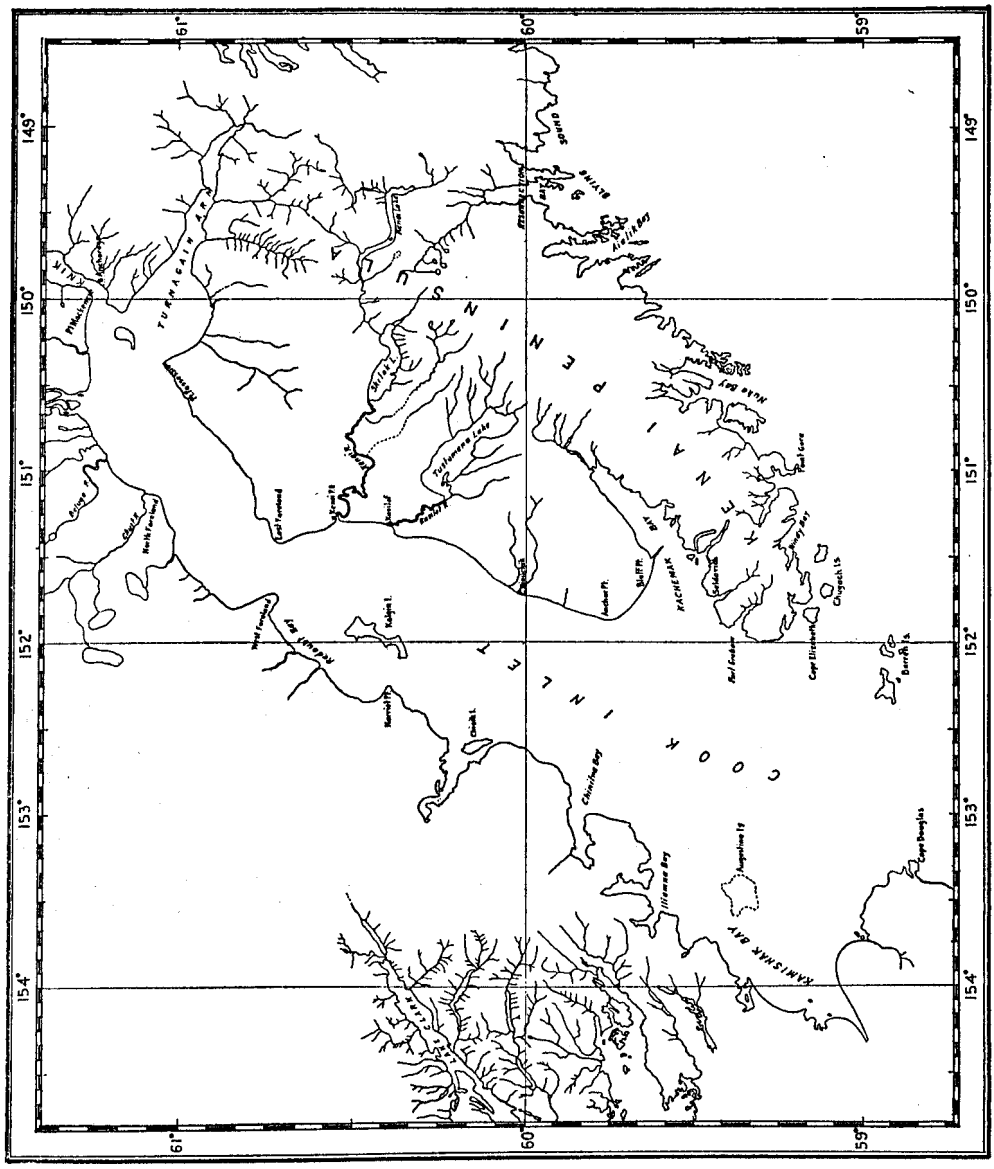

FIGURE 9.—Map of Cook Inlet and Resurrection Bay

of West Foreland to Harriet Point. This section also has its rivers, the larger ones being the Kustatan, Katnu, and Drift; but they are comparatively unimportant as salmon streams. The west shore from Harriet Point to Cape Douglas is broken by many small bays, but it has no salmon streams of importance and is the least productive of any section in Cook Inlet. On the east side of the inlet south of Anchor Point are also several bays, but this section is likewise a small producer of

salmon as it has no large tributary streams. The Kenai and Kasilof Rivers through not the largest streams in the Cook Inlet district, are regarded as the chief producers of red salmon, and also make very material contributions toward the supply of king salmon.

The shores of Cook Inlet are washed by exceedingly strong tidal currents. The intertidal range is more than 40 feet and between East and West Foreland the currents may attain a velocity of 8 knots. Nearly all of the rivers of the district are glacier fed and carry much glacial silt into the inlet, thus making the waters north of Ninilchik exceedingly roily and ideal for gill netting, although such fishing, due to the strong currents, is not feasible. Seining is also wholly impracticable. Aside from a few set nets on the beaches, traps provide the only form of fishing appliance that can be successfully operated in these waters.

In examining the statistical reports of fishery operators on Cook Inlet, it was found that localities were occasionally given names not identifiable with any designated points on charts published by the United States Coast and Geodetic Survey and it frequently happened that names were used by the packing companies without relation to recognized geographic objects, but were adopted by the companies for their individual convenience and identification. In this way several names for approximately the same locality have come into use. In many cases the less appropriate names have been disregarded, and catches have been combined to make identity more certain. For example, Cape Kasilof, a recognized point on the east shore just south of Kasilof River, was used as a locality name by all operators taking salmon at or near the cape until 1922, and thereafter it was called "Humpy Point" by some packers and so reported by them. These catches, together with others reported from "Kasilof Highland," were combined with catches from Cape Kasilof and included under the latter name in the statistical table. Similar combinations were made in respect to other sources. Salmon reported as taken at "Moose" and "Moose Trap" were included with Moose Point fish; salmon from Ladd and Chuitna River were shown as coming from Chuit River; those from Granite Point were added to Tyonik; Snug Harbor fish were shown as coming from Tuxedni Harbor; "Kenai Beaches" salmon were included in Kenai River catches; "Corea Bend" and "Highlands" were combined with The Sisters; "Reef" with Kalifonski; "Village" with Chinilna; Homer Bay with Homer Spit; Herbert & Co., with Anchor Point. Kachemak Bay catches include salmon reported from Anesum, Aurora, "French Pete," Iverson Bros., "Manuel," and Barber Point. The data are presented in Table 29.

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
SOUTHERN PART												
Anchor Point:												
1912	6,516	1,771	101,832	5,944	74,714							
1913	71			72	5,589							
1914	2,822		146,526	1,950	20,448							
1917	946	303	680	443	9,525							
1922	500	977	7,192	504	5,305							
1923	5,794	39	873	2,291	9,513							
1926	576			1,779	720							
1927	40	24	70	2,000	4,813							
Bear Cove: 1912	14	1	3,466	10	734							
Bluff Point:												
1917	3,000	6,700	6,330	955	222,000							
1918	13,606	17,600	34,830	460	174,550							
1919	7,000	6,800	8,700	300	134,300							
1920	7,750	6,880	51,100	225	131,350							
1921	780	13,700	2,750	390	248,520							
1922	11,650	25,730	127,670	1,110	69,350							
1923	3,326	3,378	12,010	516	60,291							
1924	4,870	3,275	46,100	925	80,600							
1925	3,540	4,050	4,460	2,410	91,170							
1926	3,160	13,760	61,310	3,940	130,820							
1927	3,730	14,150	22,390	5,750	115,650							
Bruin Bay:												
1919					23,000							
1920					11,900							
Chatham, Port:												
1922	3	378	4,127		6							
1924		587	6,289									
1926			1,046									
China Poot Lagoon:												
1916	120											
1924	21		4,496									
1925	450											
Chinilna:												
1910	1,275		3,500	909	53,973							
1912	1,000		8,734	164	44,016							
1913	1,200			18	62,536							
1921				115	8,372							
1922	14,151		729	515	28,657							
1923	1,833		1	517	29,443							
1924	29,156	1	34,462	2,345	140,582							
Chinitna Bay: 1920		19,500										
Clam Gulch:												
1922			929	153	8,812							
1925	332			234	22,025							
1926	658		4,528	239	16,168							
1927	630		84	996	19,795							
Cooper Creek:												
1920	1,250	1,625	8,000	95	19,850							
1921	100	1,200		120	40,400							
1922	690	3,390	9,760	115	8,960							
Dangerous Cape, and Russian Point: 1922					16,100							
Deep Creek:												
1919	1,849	33	251	151	5,788							
1921	8	2	305	3,024	49,200							
1922	990		2,600	429	8,075							
1923	754	142		1,645	5,979							
1925	3,377	177	349	4,751	14,925							
1926	5,304	528	20,554	4,642	30,865							
1927	540	149	410	2,386	24,729							
Diamond Creek:												
1919	3,070	479	1,471	60	31,058							
1920	2,379	109	4,857	486	10,736							
1926	840		2,888	154	7,001							
English Bay:												
1908	4,320				40,300							
1909					36,000							
1910					37,296							
1911	5,190		7,497	198	63,750							
1912	450	425	1,134	648	41,302							
1913	627	83	1,291		22,258							
1914	150		51,718	5,690	26,625							
1916					10,528							
1917	4,034	3,416	4,881	540	83,437							
1919	843	560	1,430	49	44,097							
1920	2,925	917	17,534	178	35,121							
1921				5	40,282							
1922	904	472	11,055	2	24,396							
1923		14	20		15,552							
1924	1,007		33,439		16,539							
Flat Island:												
1917	1,500	2,000	4,000	719	30,550							
1918	7,554	15,230	42,012	380	45,018							
1919	2,300	6,500	8,400	225	67,700							
1920	11,100	8,325	85,350	217	47,450							
1921	1,300	15,600	1,000	280	71,320							
1922	3,150	10,550	36,020	90	12,670							

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*—Contd.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
SOUTHERN PART—contd.												
Flat Island—Contd.												
1923	3,790	2,210	10,230	433	20,945							
1924	4,690	6,605	191,250	515	31,150							
1925	910	1,960	1,910	780	21,520							
1926	1,410	8,120	35,370	1,720	33,855							
1927	2,280	5,400	39,030	4,140	26,710							
Glacier Spit: 1926			3,206		9							
Graham, Port:												
1917		8,000										
1919		5,400	1,000									
1920		6,000	18,640									
1922	14	418	8,004		7							
1923		4,811	1,345		528							
1924		14,429	17,990	1	232							
1926		20,588	2,091		36							
1927	2,019	6,144	16,913	20	2,904							
Halibut Cove:												
1922	200		400									
1923	400		500									
Homer Spit:												
1919		769	6,723		43							
1925	16		2	23	2,606							
Iakaloff Bay:												
1919		1,100										
1920		21,000										
Kachemak Bay:												
1911	5,428		650	64	40,564							
1912	2,930	462	79,251	503	20,354							
1913	191	23	15		1,723							
1916	120											
1917	1,491	3,588	17,828	1	10,544							
1925			600									
1926	1,322	9,541	85,055	85	9,622							
1927	150	2,986	101,235		1,927							
Kalgin Island:												
1913	15,068		345	473	17,377							
1914			1,856	17	15,706							
1916					1,680							
1919	13,388	87	426	419	9,314							
1920	8,690		3,904	279	15,234							
1921	1,383	2	19	795	8,089							
1922	24,399	445	10,920	134	35,315							
1923	15,112		38	58	27,187							
1926	22,384	166	5,719	415	37,942							
1927	46,636	2	264	1,030	15,938							
Kalifonski:												
1912	549		5,337	74	19,561							
1913	607			338	41,860							
1922	17,555	323	4,049	1,576	50,874							
1923	3,257			606	29,941							
1925	9,510	40	22	1,976	128,218							
1926	16,785	83	20,037	1,884	196,285							
1927	4,498	190	89	3,602	133,862							
Kamishak Bay:												
1922	170		2,292	45	42,965							
1923		6	8,395		27,435							
1924	1,004		200		31,194							
Kasilof Cape:												
1913	258			874	14,700							
1914			26,979	970	33,895							
1919	1,748		65	150	9,658							
1920	11,742	25	6,865	1,123	41,336							
1921	2,047	1,500	71	1,130	97,458							
1922	9,697	94	7,628	831	37,805							
1923	3,549		52	441	36,252							
1924	9,130	575	21,440	740	63,270							
1925	8,742	53	238	1,472	114,001							
1926	4,349	210	13,135	1,249	86,225							
1927	4,734	507	1,769	2,287	73,968							
Kenai River:												
1908	1,500		6,000	1,922	76,804							
1910	2,927		5,800	1,243	52,235							
1911					107,468							
1912	1,260		2,414	90	5,377							
1913				246	44,694							
1916	100				2,000							
1919	3,809	57	80	431	42,190							
1920	8,504		6,089	172	32,988							
1921				862	82,925							

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*—Contd.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
SOUTHERN PART—CON.						*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
Koyuktolik Bay: [1]												
1916		9,000										
1917		28,000										
1919		11,500	3,000									
1920		1,851	125									
1927		854	2,444		2							
Laida Creek:												
1910	950	900	24,575	5,782	56,643							
1912	153	5,000	135,663	2,526	48,576							
1913	1,177			5,888	15,728							
1919	3,692	241	627	747	10,739							
1920	2,947	207	4,196	917	6,719							
1921	29		282	987	20,499							
Macdonald Spit: 1926			3,783									
Ninilchik:												
1914			24,787	1,447	19,259							
1917	522	131	536	2,456	29,965							
1922	5,320	2,684	30	667	9,702							
1924	3,997			3,919	18,621							
1925	2,616	116	387	698	25,012							
1926	4,938	299	10,570	3,797	52,212							
1927	382	45	42	3,182	32,041							
Porcupine:												
1913				58	1,678							
1921			10	478	15,276							
1923	3,926	21	194	586	21,114							
1925	2,617	36	146	1,118	37,635							
1926	2,394	41	7,254	680	38,460							
1927	2,210		596	1,786	35,309							
Rocky Point:												
1910				944	16,540							
1913				76	53,680							
1921	32		28	750	7,566							
1922	28		71	320	4,583							
1923	8,576	11	83	3,318	49,513							
Salamato:												
1912			178	274	35,386							
1913	295			481	107,373							
1917	3,296	5	235	181	119,118							
1918					107,785							
1919	1,000				25,000							
1920	700		2,900		49,600							
1921	4,200	5,400	9	107	66,450							
1922	7,349	64	4,558	617	43,902							
1923	10,231	200	1,163	727	79,451							
1914	21,531	261	23,279	1,021	70,955							
1925	13,244	68	530	1,748	141,820							
1926	18,257	437	24,996	1,983	188,679							
1927	17,152	720	977	3,494	119,727							
Seldovia Bay:												
1922	3	31	11,514		2							
1924	20	1,351	43,566		1							
1925		1,000	600		20							
1926		6	7,207									
Sisters, The:												
1910	1,100		11,625	414	28,879							
1912	1,079		126,865	876	53,611							
1913	5,038			4,436	90,529							
1919	5,249	101	266	888	24,523							
1920	7,442	116	7,645	3,514	42,583							
1921	1		102	546	59,119							
1922	14,425	5	17,964	3,572	99,498							
1923	7,968		134	3,455	123,493							
1924	30,670	1,807	60,720	6,309	266,566							
1925	9,377	91	405	4,634	104,183							
1926	18,427	859	53,604	3,614	215,592							
1927	7,580	650	2,707	7,839	163,594							
Starichkof:												
1912		3,190	88,934	1,262	46,004							
1913	1,944			3,008	21,477							
1917	40	211	1,948	2,254	29,961							
1919	1,873	200	582	258	14,099							
1920	3,271	103	3,913	555	6,709							
1922				1,194								
1923	6,849	139	1,513	1,092	11,312							
1926	1,586		13,283	4,509	14,631							
1927	1,460	30	700	5,422	9,994							
Tutka Bay: 1926			8,422									

[1] Koyuktolik Bay is known locally as Dogfish Bay.

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*—Contd.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
SOUTHERN PART—con.												
Tuxedni Harbor:												
1917					5,000							
1919	2,111	7,899	529	199	7,700							
1922	7,151	15,000	75	350	3,200							
1926	765	10,659		456	4,102							
1927	2,987	6,850	1,755	1,236	5,302							
Waterfalls:												
1921			65	396	20,821							
1922	7,333		7,578	772	33,775							
1923	4,885	43	315	1,097	40,029							
1925	4,809	30	222	1,178	40,785							
1926	1,769	412	4,267	1,032	44,390							
1927	2,733	13	367	1,998	34,956							
NORTHERN PART												
Bear Trap:												
1921				858	19,861							
1922	7,282		1,132	1,244	37,517							
1923	3,523	44	110	888	20,422							
1925	5,131		255	1,171	68,285							
1926	6,326	18	6,655	769	55,118							
1927	2,892	64	98	1,015	37,996							
Beluga River: 1920	1,200		18,507		33,664							
Boulder Point:												
1917	29		13	186	14,237							
1922	778	42	2,338	9	20,852							
1923	981	24	15	134	52,068							
1924			18,635		46,555							
1925				16	21,982							
1926	4,781	209	4,395	68	85,736							
1927	805	111	4	117	34,218							
Cairn Point: 1917	68	13			2,945							
Chuit River:												
1912				1,800								
1922		6,194	159,182		24,689							
1923	3,503	2,436	595	125	22,915							
1925	8,344	1,174		700	16,688							
Cottonwood: 1927	14,874	2,361	17	2,006	9,813							
East Foreland:												
1916	800				6,000							
1922	585	3	1,086	203	18,865							
1923	522	7	7	60	16,276							
1924	4,101	277	1,565	689	17,938							
1926	1,323	21	190	37	15,204							
Goose Bay: 1917	2	2	2		9,145							
Kustatan:[2]												
1910				3,158	854							
1911				12,152								
1912				5,017								
1913				3,949	2,429							
1914				4,289	542							
1916		700										
1919	9,605	120	120	772	9,280							
1920	6,854		5,607	833	23,888							
1922	26,352	399	15,624	8,798	21,611							
1923	15,561	62	336	4,266	49,632							
1924	8,358	168	5,009	10	11,761							
1926	24,269	1,001	10,429	767	53,539							
1927	49,380	3,048	61	8,306	37,426							
McKinley:												
1924	11,791	200	13,223	41	59,052							
1925	2,963			142	33,444							
1926	10,223	289	7,297	326	48,372							
1927	6,275	376		60	15,169							
Mackenzie, Point: 1917		18			2,515							
Moose Point:												
1917	345	26	2	216	4,852							
1921	47	5	14	2,008	70,236							
1922	7,248		20,485	1,441	56,942							
1923	2,186	87	197	360	32,446							
1925	7,558	89	612	766	67,546							
1926	9,911	1,114	8,634	831	74,971							
1927	24,309	31	24	1,159	43,579							
Nikishka:												
1910	300		500	840	18,199							
1912	250		7,446	3	18,909							
1913				676	51,806							
1917	125		2	3	5,761							
1919	892	186	829	76	19,618							
1920	10,819		6,929	28	29,805							
1922	448	1,509	21,129	396	26,133							

[2] Kustatan includes 12,152 red salmon reported from Kustatan and Tyonic in 1911.

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*—Contd.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
NORTHERN PART—CON.												
Nikishka—Continued.												
1923	5,169	169	574	352	65,797							
1925	6,103	48	48	446	58,293							
1926	4,080	570	8,233	524	81,925							
1927	10,364	862	982	1,545	62,265							
Nikolai River: 1927	3,476	2		266	3,158							
Possession, Point:												
1913					18,092							
1917	212	186	33	1,620	13,622							
1921			2	357	8,368							
1922	18,010	728	39,585	865	53,087							
1923	2,031	219	163	345	26,599							
1924	14,422	3,340	71,982	750	67,937							
1925	7,909	360	295	453	41,546							
1926	6,011	2,348	9,574	442	35,596							
1927	9,167	652	50	1,013	24,490							
Swanson Creek:												
1917	4	5	14	193	4,367							
1927	2,263	26	13	61	6,171							
Three-Mile Creek:												
1917	1,452	10,917	44	4,497	37,814							
1922	6,006	2,654	75,042		14,409							
1923	4,245	2,283		12	10,829							
1924	3,570	3,726	85,170	3,168	24,179							
1926	9,084	1,384	7,110	17	12,035							
1927	15,454	1,381	11	1,322	9,706							
Trading Bay:												
1925	3,630	274	8	2,250	4,770							
1927	24,108	3,547		97	18,101							
Tyonek:												
1910				1,910	590							
1911				2,000								
1912				3,073								
1913				4,588	113							
1914				7,748	4,410							
1917	1,000	4,500		8,728	24,822							
1919	6,717	1,434	81	1	6,324							
1922	3,077	2,060	20,527	2,464	6,420							
1923	10,116	235	26	3,012	22,057							
1924	11,491	108	20,676	1,623	13,755							
1925	24,792	1,918		1,722	49,588							
1927	23,507	5,338		2,941	18,947							
West Foreland:												
1924	18,391	45	11,205	4,673	28,935							
1927	21,354	398		889	10,680							
Woronzof, Point: 1917	179	229			11,840							
Unallocated:												
1893	34,000			30,000	170,000							
1894	19,000			15,500	406,840							
1895				25,199	324,277							
1896	27,600		37,800	18,076	309,863							
1897	28,000			14,083	354,800							
1898	83,412			16,389	551,168							
1899	54,890			17,102	558,529							
1900	20,000			26,693	585,309							
1901	8,967		5,591	34,319	482,406							
1902	54,864		79,246	49,013	710,280							
1903	58,968			66,023	564,189							
1904	23,800			30,073	17,668							
1905				17,668	95,547							
1906	93,485		64,100	22,420	225,506							
1907	177,276		6,420	62,944	460,620							
1908	89,116		369,140	31,852	553,670							
1909	88,350		3,740	59,624	546,562							
1910	73,150	418	171,666	33,828	574,878							
1911	74,626	671	62,262	41,391	1,035,032							
1912	54,001	110,057	1,100,270	24,792	770,124							
1913	52,643	10,452	9,275	38,471	793,697							
1914	181,763	39,905	1,000,984	25,243	1,346,444							
1915	114,148	27,833	18,508	83,763	1,851,034							
1916	204,538	118,622	1,168,672	62,895	1,676,775							
1917	39,143	10,084	17,107	42,462	958,837							
1918	218,861	69,907	639,401	34,027	1,301,371							
1919	82,770	9,423	3,234	18,686	432,573							
1920	195,685	30,804	192,822	30,602	752,149							
1921	3,000	5,000		700	24,000							
1922	2,572	239	6,110	2,614	23,381							
1923	14,833	6,901	257	3,567	174,706							
1924	5,136		41,230	226	51,284							
1925	72,162	3,580	739	22,344	404,796							
1926	165,093	45,583	131,055	39,661	407,795							
1927	70,685	2,469	58,764	19,439	303,607							

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*—Contd.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
NORTHERN PART—CON.												
Total:												
1893	34,000			30,000	170,000							
1894	19,000			15,500	406,840							
1895				25,199	324,277							
1896	27,600		37,800	18,076	309,863							
1897	28,000			14,083	354,800					30		8
1898	83,412			16,389	551,168	1				50		8
1899	54,890			17,102	558,529	1				50		8
1900	20,000			26,683	585,309	1				57		13
1901	8,967		5,591	34,319	482,406	1				65		13
1902	54,864		79,246	49,013	710,280	1				43		17
1903	58,968			66,023	564,189	1				35		17
1904	23,800			30,073	489,348					14		8
1905				17,668	95,547					20		9
1906	93,485		64,100	22,420	225,506					18		6
1907	177,276		6,420	62,944	460,620	1	150			44	1,000	9
1908	94,936		375,140	33,774	670,774	2	300			42	5,100	13
1909	88,350		3,740	59,624	582,562	4	310			31	9,300	11
1910	79,702	1,318	217,666	49,028	840,187	3	200			93	5,230	20
1911	85,244	671	70,409	55,805	1,246,814	3	464	1	250	90	5,008	22
1912	68,202	120,906	1,661,524	47,056	1,178,668	3	204	4	680	102	6,570	35
1913	79,119	10,558	10,926	63,652	1,367,339	5	644			144	7,120	44
1914	184,735	39,905	1,252,850	47,354	1,467,329	4	414	1	100	208	5,840	46
1915	114,148	27,833	18,508	83,763	1,851,034	3	70			346	10,830	55
1916	205,678	128,322	1,682,672	62,895	1,696,983	8	565			155	7,810	54
1917	57,388	78,334	53,655	65,454	1,630,857	6	380			437	14,070	65
1918	240,021	102,737	716,243	34,867	1,628,724	29	1,719			341	9,005	65
1919	147,916	52,889	37,814	23,412	917,004	2	175			245	6,375	54
1920	283,258	97,462	444,983	39,224	1,291,082	7	430			327	8,980	50
1921	12,927	42,409	4,717	13,908	958,852	3	205			110	2,750	27
1922	198,040	74,389	637,405	31,030	847,865	14	1,415			240	6,375	55
1923	142,920	23,481	39,146	29,903	1,081,725	11	1,005	1	200	192	5,844	58
1924	183,356	36,755	752,016	26,955	1,041,106	3	250	1	200	198	4,950	37
1925	198,132	15,064	11,828	51,033	1,510,858	2	95			229	3,260	55
1926	346,025	118,246	581,897	75,620	1,978,505	21	610			272	6,515	71
1927	378,674	59,380	251,866	87,404	1,456,547	2	65			357	9,125	92
Total east shore (estimated):												
1893	26,860			23,700	134,300							
1894	15,010			12,245	321,404							
1895				19,909	256,160							
1896	21,804		29,862	14,281	244,792							
1897	22,120			11,126	280,292					30		8
1898	65,896			12,948	435,423	1				50		8
1899	43,364			13,511	441,238	1				50		8
1900	15,800			21,080	462,394	1				57		13
1901	7,086		4,418	27,112	381,101	1				65		13
1902	43,343		62,605	38,720	561,122	1				43		17
1903	46,585			52,158	445,710	1				35		17
1904	14,281			18,045	293,609							6
1905				10,602	57,329							7
1906	56,092		38,461	13,453	135,305							4
1907	109,366		3,852	38,867	280,372							8
1908	59,390		227,285	22,201	450,964							9
1909	53,010		2,245	35,775	363,938							9
1910	50,143	1,152	148,500	29,589	590,593							17
1911	64,097	404	55,770	29,580	968,858							19
1912	51,633	118,797	1,384,913	29,747	949,884							30
1913	44,537	9,002	7,364	41,130	1,058,896							35
1914	122,259	39,283	954,503	25,489	1,013,546							36
1915	69,931	22,964	14,502	6,327	1,237,029							41
1916	132,796	102,340	1,137,705	41,125	1,300,264							42
1917	42,656	60,033	48,626	37,460	1,213,901							42
1918	170,204	87,482	561,672	23,128	1,227,388							18
1919	88,357	40,036	33,458	16,513	686,354							33
1920	203,177	52,491	382,541	29,768	966,460							34
1921	8,365	37,402	4,672	7,854	813,022							21
1922	79,234	45,296	258,606	10,673	429,605							33
1923	61,954	12,043	28,188	17,795	600,143							36
1924	105,092	28,891	473,121	15,775	688,416							20
1925	74,979	8,291	10,189	26,601	840,106							31
1926	87,709	55,460	403,455	35,134	1,022,172							45
1927	75,401	33,099	243,263	55,894	963,255							57
Total west shore (estimated):												
1893	340			300	1,700							
1894	190			155	4,068							
1895				251	3,242							
1896	276		378	180	3,098							
1897	280			140	3,548							
1898	834			163	5,511							
1899	548			171	5,585							
1900	200			266	5,853							

TABLE 29.—*Salmon catch and fishing appliances used in the Cook Inlet district, 1894 to 1927*—Contd.

Year	Coho	Chum	Pink	King	Red	Beach seines		Purse seines		Gill nets		Traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
NORTHERN PART—CON.												
Total west shore (estimated)—Contd.												
1901	89		55	343	4,824							
1902	548		792	490	7,102							
1903	589			660	5,641							
1904	1,586			2,004	32,623							
1905				1,177	6,369							
1906	6,232		4,273	1,494	15,033							
1907	8,818		428	3,096	26,708							
1908	5,841		24,809	956	35,254							
1909	5,890		249	3,975	36,437							
1910	4,876	27	11,444	2,255	38,325							
1911	3,524	44	2,592	2,029	46,326							
1912	4,186	1,090	92,345	1,483	56,382							
1913	18,749	988	1,018	3,327	81,460							1
1914	10,412	103	51,158	1,610	86,445							1
1915	7,770	2,551	1,611	56,951	137,447							1
1916	6,024	4,913	59,879	2,164	69,455							1
1917	1,464	404	641	1,574	40,726							3
1918	8,686	2,876	25,517	1,178	47,370							4
1919	18,600	8,331	1,072	1,319	56,234							8
1920	16,350	20,891	11,756	1,477	56,226							6
1921	1,383	2	19	795	17,089							3
1922	31,831	15,445	13,516	544	81,737							6
1923	21,092	5,449	8,445	58	57,234							3
1924	1,004		200		31,194							2
1925	4,910	314	45	2,670	16,031							
1926	23,826	10,825	7,771	871	45,217							3
1927	75,405	10,490	4,954	3,113	53,061							5
Total northern part (estimated):												
1893	6,800			6,000	34,000							
1894	3,800			3,100	81,368							
1895				5,039	64,855							
1896	5,520		7,560	3,615	61,973							
1897	5,600			2,817	70,960							
1898	16,682			3,278	110,234							
1899	10,978			3,420	111,706							
1900	4,000			5,337	117,062							
1901	1,792		1,118	6,864	96,481							
1902	10,973		15,849	9,803	142,056							
1903	11,794			13,205	112,838							
1904	7,933			10,024	163,116							2
1905				5,889	31,849							2
1906	31,161		21,366	7,473	75,168							2
1907	59,092		2,140	20,981	153,540							1
1908	29,705		123,046	10,617	184,556							2
1909	29,450		1,246	19,874	182,187							2
1910	24,683	139	57,722	17,184	211,269							3
1911	17,623	223	12,047	24,196	231,630							3
1912	12,383	1,019	184,266	15,826	172,402							5
1913	15,833	568	2,544	19,195	226,983							8
1914	52,064	519	247,189	20,255	367,335							9
1915	36,447	2,318	2,395	20,485	476,558							3
1916	66,858	21,069	485,088	19,606	327,264							11
1917	13,268	17,897	4,388	26,420	376,230							20
1918	55,131	12,379	129,054	10,561	353,966							18
1919	40,959	4,522	3,284	5,580	174,416							13
1920	63,731	3,080	71,686	7,979	268,396							10
1921	3,179	5,005	26	5,259	128,741							3
1922	86,975	13,648	365,283	19,813	336,523							16
1923	59,874	5,989	2,513	12,050	424,348							19
1924	77,260	7,864	278,695	11,180	321,661							15
1925	118,243	6,459	1,594	21,762	654,721							24
1926	234,490	51,961	170,671	39,615	911,116							23
1927	227,868	15,791	3,649	28,397	440,231							30
Total Kachemak Bay:												
1911	5,428		650	64	40,564							
1912	2,944	463	82,717	513	31,088							
1913	191	23	15		1,723							
1916	240											
1917	1,491	3,588	17,828	1	10,544							
1919		709	6,723		43							
1922	203	31	11,914		2							
1923	400		500									
1924	41	1,351	48,062		1							
1925	486	1,000	1,202	23	2,626							
1926	1,322	9,547	107,673	85	9,622							
1927	1,953	2,986	101,235		1,927							
Rocky Bay: [1] 1926	513	88	4,140									

[1] Outside of Cook Inlet proper and not included in above totals.

NOTE.—No catch was reported in the years not shown in any division of this table.

The unallocated catch includes small occasional catches reported from the following sources: East Shore, Fish Creek, Knik Arm, Little Campbell Creek, McManus Beach, Urta, West Point, White Rock Beach, Polly Creek, Demetra & Co., Sawa & Co., and Portuguese Point. In addition, it includes a large part of the entire Cook Inlet catch, which was reported only as from Cook Inlet. There was no allocation at all previous to 1907 and it has not been complete even to date. The fishing in the inlet is so scattered that it may never be possible to get a complete and accurate allocation. As large as these unallocated totals are, the records do not make it possible to assign them accurately to any of the subdivisions of the district. For purposes of analysis, however, a division of such a large percentage of the total catch as is here unallocated is very desirable. It has, therefore, been necessary to make what is frankly a more or less arbitrary distribution of these unallocated catches among the three relatively distinct regions of the inlet—northern, east shore, and west shore. The total estimated catches in these three regions are given after the section of the table devoted to the Cook Inlet totals. By northern part is meant all the waters of the inlet north of a line between East and West Foreland. The southern part is south of that line and is further divided into the east shore and west shore which extend, respectively, from East Foreland and West Foreland to the southern limits of the inlet.

The allocations made have been based upon the best information available and in more recent years were in accordance with available knowledge of local conditions, particularly the location of the canneries and their known field of operation. From 1894 to 1903 one-fifth of the catch was credited to the northern part of the inlet. From 1904 to 1910, inclusive, one-third of the unallocated catch was credited to the northern part. Since 1910 it has been possible to make the allocations on the basis of local knowledge, but when this has not been sufficiently complete one-fourth of the unallocated portion has been credited to the northern part. From one-tenth to one-twentieth of the catch shown as coming from the southern part was allocated to the west shore unless it was definitely known that certain packers did not operate in those waters, and that a different division should be made.

No fixed rule could be followed in making these allocations. These arbitrary allocations are made in full realization of the fact that they are not, and indeed can not be, scientifically done and that in some quarters attempting such an adjustment will be criticised. It is unfortunate that more accurate data are not available, but that is a matter that can not be remedied at this late date. An allocation such as that here attempted is certainly desirable, and it seems rather doubtful that any future workers in this field will have access to more accurate data or that anyone will have available a better fund of local information as to conditions during the period under discussion. All the detailed information available is presented here, and those who may feel inclined to disagree with the allocations may disregard them. It is believed, however, that for the purposes of this analysis, the allocations here shown may be accepted as essentially correct.

In another section of the table is given the combined catch in Kachemak Bay, which includes Bear Cove, China Poot Lagoon, Glacier Spit, Halibut Cove, Homer Spit, MacDonald Spit, Seldovia Bay, and Tutka Bay; but exclusive of those taken at Bluff Point and Cooper Creek, two points on the north shore of Kachemak Bay where the run of salmon to the upper waters of the inlet strikes before passing north of Anchor Point.

The last division of the table shows a small catch of salmon in 1926 at Rocky Bay, a locality east of Cape Elizabeth and therefore not included in Cook Inlet catches.

Salmon canning on Cook Inlet began in 1882 and it has been continued without interruption ever since. No records are available showing the number of salmon of each species taken in the first 11 years of its history, but the pack in that period, irrespective of species, was reported by Moser [16] whose figures are accepted as the most reliable for this period, although the catch records of Murray [17] for 1893 have been used as being the first year in which catch statistics were published. A fair estimate of the number taken each year prior thereto could be made by assuming that the pack was 80 per cent red salmon, 10 per cent kings, and 10 per cent cohos. By figuring reds at 15 fish per case, kings at 3, and cohos at 9, a satisfactory estimate of the catch by species in these earlier years can be made.

Table 30 shows the total pack in cases for the first 12 years of salmon packing in this district:

TABLE 30.—*Pack of canned salmon on Cook Inlet, 1882–1893*

Year	Cases	Year	Cases	Year	Cases	Year	Cases
1882	6,044	1885	19,217	1888	42,421	1891	58,997
1883	14,818	1886	28,433	1889	50,494	1892	20,741
1884	21,141	1887	30,765	1890	28,655	1893	31,665

In the 6-year period from 1882 to 1887, 1 cannery operated on Cook Inlet; in the next 3 years 2 canneries were in operation; in 1891 there were 3; from 1892 to 1897, another period of 6 years, 1 cannery alone occupied the field. In 1898 and 1899, there were 2; in 1900 to 1902, there were 3; in 1903, the season opened with 2 canneries in operation, but 1 plant was destroyed by fire at the height of the season. From 1904 to 1909, there was no increase in the number of canneries, but 2 salteries were operated in 1907 and 1908, and 1 in 1909. In 1910, the number of canneries increased to 2, 1 more was added in 1911, 2 in 1912, bringing the number to 5. Another was added in 1915, and except for the destruction by fire of 1 plant at Kenai, which was rebuilt the following season, no change in the number of canneries occurred until 1918, when it was reduced to 5 by the permanent closing of a small plant on Goose Bay near the head of Knik Arm. Only 4 were operated in 1919, 7 in 1920, 4 in 1921, and 9 in 1922. The number decreased in the next two years and then gradually increased to 11 in 1927.

In this connection, consideration should also be given to the number of traps operated in Cook Inlet as having a direct relation to the catch and to the number of canneries. As new canneries are opened, fishing appliances are increased or a corresponding division made of the then operating equipment in order that the lately established plants may obtain a supply of fish; usually the alternative first mentioned is followed. From the beginning of canning in 1882, until the close of the season of 1896, fishing was probably limited by choice to the use of beach seines and gill nets operated in the rivers. At least no reference to the use of traps is found in any published report until 1897 when eight were installed and successfully fished. Thereafter for 13 years the number of traps used in any season did not exceed 20, and

[16] Alaska Salmon Investigations in 1900 and 1901, by Jefferson F. Moser. Bulletin, U. S. Fish Commission, Vol. XXI, 1901 (1902), pp. 175–398. Washington.

[17] Report of the Salmon Fisheries of Alaska, 1894, by Joseph Murray, special agent. Washington, 1896.

the number of canneries was not more than 3. In 1912, the number of canneries had increased to 5, the number of traps to 34, and the largest catch of salmon considering all species, was recorded although the catch of reds was about 70,000 less than in 1911. From then until 1918, there was a gradual increase in the number of traps, and the number of canneries fluctuated from five to six while the catch reached higher levels than ever before attained and was consistently well above the average of earlier years.

After 1918 there was considerable fluctuation in the number of canneries and traps operated as well as in the catch of salmon, the lowest level in years being reached in 1921, due to economic depression which affected the fisheries industry generally throughout Alaska. Recovery from this depression was rapid, however, as both canneries and traps multiplied twofold, and the highest level of production ever known in the Cook Inlet district was reached in 1926. In 1927, the number of canneries and traps was materially increased, but the catch was appreciably lower although not far below the average of the last 12 years. All of the new canneries in this district were small and their combined capacity and output would scarcely equal that of any one of the long-established plants such as are found at Port Graham,

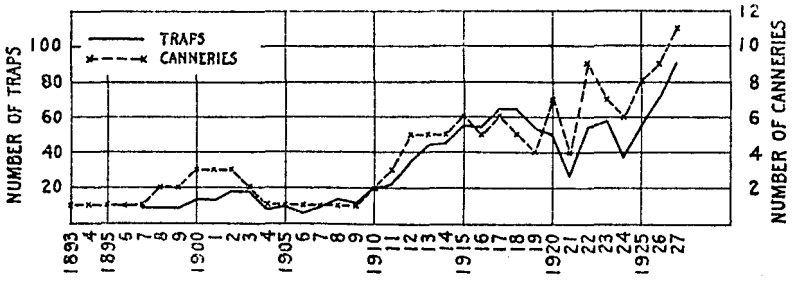

FIGURE 10.—Number of canneries and traps operated on Cook Inlet

Kasilof, and Kenai. Similarly the increase in traps was due in large measure to the operation of many so-called mosquito traps which were hand driven on the mud beaches of the west shore north of West Foreland. These traps are equipped with plank floors about 3 feet above the ground and are entirely out of the water at low tide. For that reason they are not continuously fishing like the deep-water traps and their catches are relatively smaller. If all traps were of the same size and effectiveness, it would be obvious that with increase in number fishing had become more intensive; but it is apparent that in Cook Inlet the intensity of fishing has not changed proportionately with the addition of more canneries and traps.

The increase in canneries and traps is shown graphically in Figure 10.

The purpose of this brief description of the development of the salmon fisheries of Cook Inlet is to make possible a correct understanding of present conditions and the analysis of catches by species which follows. With such incomplete data to deal with it is obviously impossible to make satisfactory analysis of the catches in minor localities. It has been necessary, therefore, to consider only the larger sections and Cook Inlet as a whole.

RED SALMON

From the inception of the industry in 1882 to the present time the red salmon have constituted the main dependence of the fisheries. Beginning in 1893, when catch statistics were first available, the general trend of production has been steadily

upward. (See fig. 11.) This upward trend was interrupted between 1902 and 1908, and again for a period of several years beginning in 1919. The first interruption is easily explained. Only 2 canneries of the 3 that operated in 1902 resumed packing in 1903, and at the height of the season 1 of these was destroyed by fire. The reduction in pack that followed was not, according to Kutchin [18] due to scarcity of salmon. In 1904, with only one cannery in the field, Kutchin [19] again reported that salmon were never more plentiful, and that the pack would have been larger had not the supply of tin been exhausted before the run was over. He also pointed out that this year the run at first was heaviest from the north, indicating that the salmon had held a course some distance from shore on their northward movement into the inlet and thus avoided the traps until they approached the rivers on their rush down the inlet. On July 12, 1905, the only remaining cannery on the inlet was destroyed by fire just at the beginning of what promised to be a good season. The falling off in catch from more than 700,000 in 1902 to less than 100,000 in 1905 was not due to biological causes but to the interruption of activities by disastrous fires. Recovery from this shrinkage in pack in the next 10 years was rapid and somewhat spectacular, the catch moving from the low level of 1905 to more than 1,850,000 in 1915. Three good years then followed in which the catches were only slightly below the peak of 1915. The catches for the next six years, 1919 to 1924, inclusive, were decidedly lower, a sudden drop in 1919 bringing the catch to 917,000—the lowest point production had reached in nine years. In 1920, the catch improved slightly but it again fell in 1921 to approximately 950,000, largely for economic reasons as there were fewer canneries in operation and a marked decrease in the number of traps and gill nets in use. After 1922 another upward movement began which was even more rapid than the one in 1915; it culminated in a catch of nearly 2,000,000 reds in 1926, despite the limitation of fishing season and the total prohibition of fishing in certain areas under authority conferred by the fishery law enacted in 1924. The escapement in 1926 was also reported to be exceptionally large. In 1927, the catch again approached 1,500,000, a considerable drop from the year before, but still a good year for Cook Inlet.

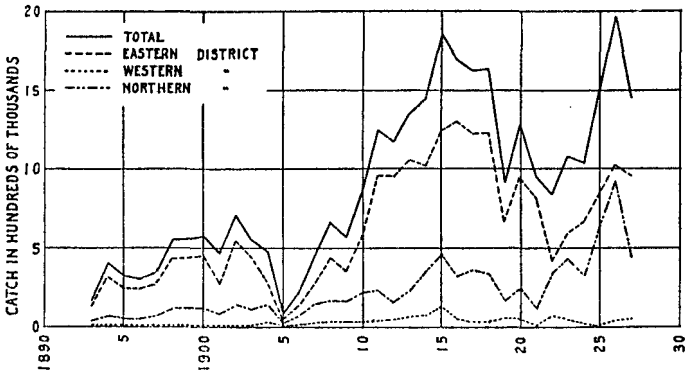

FIGURE 11.—Catch of red salmon in Cook Inlet

With all its wide expanse of water and large streams, Cook Inlet has never produced a run of salmon equal to that found in several smaller districts, such as Karluk for instance, and it seems unlikely that it will ever be a much larger producer than it is now. The red salmon run is of extremely short duration. It strikes the inlet about the middle of July and by the end of the month is practically over; the schools make rapid progress to the spawning streams, particularly those along the east shore. As a general thing, about 65 per cent of the catch is made south of

[18] Report on the Salmon Fisheries of Alaska, 1903 (1904), by Howard M. Kutchin, Washington.
[19] Report on the Salmon Fisheries of Alaska, 1904 (1905), by Howard M. Kutchin, Washington.

East Foreland, though in a few recent seasons the district north of the Forelands produced almost half of the catch. Owing to the physical peculiarities of the inlet north of Anchor Point, where there are no bays or conspicuous indentations where fishing could be localized, it has been impracticable to attempt an allocation of the catch to particular streams, and it was necessary to adopt the names of localities used by the canning companies and show the catch at such places. By noting, for example, the catches at Bluff Point, Kalifonski, Cape Kasilof, Salamato, Nikishka, Point Possession, Deep Creek, and Clam Gulch, it might be inferred that important streams enter the inlet at these places, but such inference would be incorrect. These names and many others shown in the table are simply the designations of landmarks which bear no necessary relation to the probable destination of the salmon captured. It is quite certain, for example, that the traps at Bluff Point, or at Starichkof, take chiefly Kenai and Kasilof River fish rather than salmon bound to the streams nearest their respective locations.

Only in some of the small bays below Anchor Point where salmon were taken by seines and gill nets, can definite allocations be made. Tagging experiments conducted in 1929 showed that in the region of Flat Island the salmon taken in the commercial fishery are chiefly of local origin,[20] but at Nubble Point in Kachemak Bay the catch of red salmon evidently comes from runs that belong to streams north of Anchor Point, presumably chiefly Kenai and Kasilof Rivers. South of the Forelands the salmon runs tend to follow the east shore north of Anchor Point, but above the Forelands they are dispersed to both shores. It is also significant that traps just north of Cape Kasilof show about the same catch as the traps just south of the Forelands, indicating that a considerable part of the run stands far enough off shore in passing through the lower part of the inlet to escape the traps there. Traps near the Kenai and Kasilof Rivers appear to be relatively better producers than any others, indicating with reasonable certainty that these rivers are the more important spawning streams in the district. The fact that traps as far north as Point Possession and Moose Point make as large catches as those located at Starichkof, Ninilchik, Porcupine, and Laida Creek in the southern part of the inlet is also significant as showing that salmon were fairly abundant even at the northern limit of the waters that are now open to commercial fishing. In view of that circumstance it seems probable that there are reasonable escapements to the streams of the upper part of Cook Inlet.

The fishery along the western shore south of the Forelands obviously, has never been of great importance. Considering Cook Inlet as a whole, there is nothing to indicate depletion of the red salmon runs, though there have been rather wide fluctuations in catch in recent years. In general the catch shows no definite tendency to decrease and it does not appear probable that this is the result of a corresponding increase in the intensity of fishing. On the other hand the relatively stringent regulations that have been effective since 1924 do not seem to have affected the catch in the slightest. It is believed that Cook Inlet is decidedly limited in its productivity, and the prophesy is ventured that the district can not withstand any great increase in the exploitation of the salmon resources without grave danger of depletion.

OTHER SPECIES

Cook Inlet takes third place in the production of king salmon, being exceeded only by the catch by trollers in southeastern Alaska and the gill-net catch at Nushagak Bay in western Alaska. The history of the development of the king-salmon fishery

[20] Salmon Tagging Experiments in Alaska, 1929 (1930), by Seton H. Thompson.

is inseparable from that of the red salmon. Exploitation of both species began at the same time and developed simultaneously at about the same rate. Kings were as much sought after as reds; they were taken in the same localities by both traps and gill nets, but no record was made of the number taken until 1893. In the next 15 years, though catch records were kept, no allocations were made to specific streams or places; all catches were simply shown as coming from Cook Inlet. Nothing could be done, therefore, with these statistics beyond showing them as unallocated. As the industry expanded more attention was given by the operators to the furnishing of detailed information in respect to places where salmon were caught, so that in later years a more general compliance with the Government's requirements in the matter of fishery statistics resulted in well-defined allocation of catches; but even then, as in the case of the red salmon, there still remained a large unallocated catch. At first, fishing was confined to areas near the canneries; in fact much of it was done directly in the rivers on which the packing establishments were located, notably the Kasilof, Kenai, and Chuit. Both gill nets and traps were set in these streams, but in time river fishing was prohibited. Before traps became the preferred form of fishing appliance, two-thirds of the king-salmon catch was taken by gill nets. In late years, however, traps have caught far more kings than have been taken in gill nets, though the latter are used now as set nets along the west shore in the vicinity of Kustatan, Tyonek, and Ladd with very good results. In early days, drift gill netting was commonly practiced with moderate success despite the difficulties of fishing in the strong tidal currents north of Kalgin Island where this manner of fishing was employed.

TABLE 31.—*Graphic table showing catch of king salmon in Cook Inlet, 1893–1927*

[Each letter represents 5,000 fish]

Year	Catch
1893	XXXXXX
1894	XXX
1895	XXXXXX
1896	XXXX
1897	XXX
1898	XXXX
1899	XXXX
1900	XXXXXX
1901	XXXXXXX
1902	XXXXXXXXXX
1903	XXXXXXXXXXXXX
1904	XXXXXXX
1905	XXXX
1906	XXXXX
1907	XXXXXXXXXXXX
1908	XXXXXXX
1909	XXXXXXXXXXX
1909	XXXXXXXXXXX
1910	XXXXXXXXX
1911	XXXXXXXXXXX
1912	XXXXXXXXX
1913	XXXXXXXXXXX
1914	XXXXXXXXX
1915	XXXXXXXXXXXXXXXX
1916	XXXXXXXXXXX
1917	XXXXXXXXXXXXXXX
1918	XXXXXXX
1919	XXXXX
1920	XXXXXXX
1921	XXX
1922	XXXXXXX
1923	XXXXXX
1924	XXXXXX
1925	XXXXXXXXXX
1926	XXXXXXXXXXXXXX
1927	XXXXXXXXXXX

Table 31 shows graphically the catch of kings from 1893 to 1927. Fluctuations at first had apparently little significance; but from the low catch of 14,083 in 1897 there was a steady rise through six years until the catch reached 66,023 in 1903, and then dropped suddenly to 17,668 in 1905 due to the loss of canneries by fire, as explained above, rather than to a scarcity of fish. As canneries were reestablished, the catch again climbed rapidly and in the next two years almost reached the high level of 1903. Then began a series of mild fluctuations which culminated in a new peak catch of 83,763 in 1915, from which another decline occurred and for a period of seven years (1918 to 1924) the catches were only about half the average catch for the preceding decade. It is interesting to note how closely these larger fluctuations in the catch of king salmon coincide with those in the catches of reds which were also greatly reduced from 1919 to 1924, inclusive. It seems quite certain that this depression was partly economic, but it is thought that kings were actually somewhat scarcer after 1917 than for several years preceding. The recovery from this period of poor catches was rapid and abrupt and it brought the catch of 1927 to the highest level ever reached in the production of king salmon in the Cook Inlet district.

Practically nothing of a biological nature is known of the Cook Inlet king salmon. Its spawning grounds are unexplored; its age at maturity is unknown, and the run in one year bears no apparent relation to that of any other year in so far as shown by the catch statistics. Until these gaps in our information are filled we can not be sure of just what is happening to the salmon runs, but from the data considered here no definite evidence is seen that the king salmon have suffered any alarming depletion in more than 40 years of uninterrupted fishing.

PINK SALMON

The supply of pink salmon in Cook Inlet has never been large if the catch may be accepted as an indication of the size of the run. Apparently no serious effort was made to take this species until after 1907. Previously the annual catch had never been more than 100,000 and in several years none was reported. Beginning in 1906, pink salmon have been taken every year, the larger catches falling in the even years, while the number taken in the odd years was invariably negligible until 1927. This oscillation in runs is clearly illustrated in Table 32. Only three times in 32 years has the catch exceeded 1,000,000, thus giving rather positive proof that the inlet is not an important producer of pink salmon. The first large catch was reported in 1912 when 1,661,524 were taken. Two years later 1,252,850 were caught and in 1916—the last of the three big years—the catch was 1,682,672. Since then it has varied between about five and seven hundred thousand. This reduced catch since 1916 is probably due to biological causes, although it may be that in later years the fishing effort has not been sustained after the runs of other species was over. The prohibition of fishing in 1924 from August 10 to the end of the year and in 1926 from August 10 to 25, may also have cut into the pink-salmon season so as to render larger packs impossible.

TABLE 32.—*Graphic table showing catch of pink salmon, Cook Inlet, 1906–1927*

[Each letter represents 50,000 fish]

Year	Catch
1906	XX
1907	X
1908	XXXXXXXX
1909	X
1910	XXXXX
1911	XX
1912	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1913	X
1914	XXXXXXXXXXXXXXXXXXXXXXXXXX
1915	X
1916	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1917	XX
1918	XXXXXXXXXXXXXXX
1919	X
1920	XXXXXXXXX
1921	X
1922	XXXXXXXXXXXXX
1923	X
1924	XXXXXXXXXXXXXXXX
1925	X
1926	XXXXXXXXXXXX
1927	XXXXXX

Pink salmon were taken in all important localities in the inlet, but the bulk of the catch was unallocated prior to 1918. In 1916 the entire catch was unallocated, and high percentages in earlier years were likewise reported as merely coming from Cook Inlet. Data for subsequent years are more definite and can be discussed with reasonable exactness. It is known that before 1921 there was comparatively little fishing for pinks south of Bluff Point, but it seems impossible to make a finer division of the unallocated catch in those earlier years beyond that shown in the three sections termed "east shore," "west shore," and "northern part." Since 1921 the catch of pinks has come chiefly from the east shore, except in three instances when noteworthy catches were made in the northern part of the inlet. One of these occurred in 1922 when 159,182 pinks were taken in the vicinity of Chuit River and the other two in 1924 at Three Mile Creek and Point Possession. Since 1924 no locality north of the Forelands has produced any considerable number of pinks. In 1926, 45 per cent of the catch, exclusive of unallocated fish, came from waters of the eastern shore south of Anchor Point; and in 1927, 94 per cent of the allocated catch, or 72 per cent of the entire inlet catch, came from the same waters, of which 55 per cent, or 101,235, came from the south shore of Kachemak Bay east of Seldovia Bay—a district that had been fished but little until recently. Nineteen hundred and twenty-seven provided the largest catch of pink salmon recorded for any odd year since fishing commenced on the inlet. This is an interesting development of the pink-salmon fishery in showing a departure from the old order of things and contrary to the well-established notion that runs of pinks are very light in the odd years. A quarter of a million salmon from a district the size of Cook Inlet is not a large catch in one season, but in comparison with the average catch in preceding off years it constitutes a change worthy of more than passing notice. It is interesting to note, however, that in various other places throughout central Alaska 1927 was an exceptionally productive odd year. Bower [21] in discussing the small pack of 1927 says: "A contributing factor also was the smaller run of humpback salmon that occurs in central Alaska in alternate years, although it may be noted that while the catch of this species was considerably less than in 1926 and 1924, it

[21] Alaska Fishery and Fur-Seal Industries in 1927. By Ward T. Bower, Report U. S. Commissioner of Fisheries for 1928.

was larger than for any year prior to 1924, and far in excess of any previous off-year catch in the district." Everything indicates that the odd-year runs of pinks have suddenly built up to approximately the level of the even-year runs. If the future odd-year runs continue to improve and the even-year runs are maintained unimpaired, it will mean a large increase in the pink-salmon packs in central Alaska. The reason for this sudden development is quite unknown and will doubtless remain so, although it may be suggested that the winter of 1925–26, which followed the spawning that produced the large run of 1927, was exceptionally mild. It was a matter of common observation that this was the case, and the fact is recorded in the reports of the Weather Bureau.

COHO SALMON

Since 1893 Cook Inlet has produced cohos in every year except 1895 and 1905. Catches were small prior to 1907, and also in the five years immediately following that season. (Table 33 shows the catches since 1906.) The exceptional catch in 1907 is unexplained in any literature on the fisheries of the inlet examined, and nothing is known of the distribution of cohos in that year, as the catch was entirely unallocated. In 1914 the catch began a fluctuating movement similar to that of pinks, with good catches made in the even years and poorer catches in the odd years. This continued until 1923, but since then the 2-year cycle has not been apparent. It is probable that these are due to some association between the fisheries for pinks and cohos. In general, the trend has been and still is upward. The poor pack in 1921 was not indicative of a scarcity of fish, but was undoubtedly owing to economic causes. In 1927 the catch reached a total of 378,674 and marked a new high level of coho production in the Cook Inlet district. It is interesting to note that 49 per cent of the allocated catch in 1926 and 62 per cent in 1927 came from localities north of East and West Foreland. In 1920 the third best year of coho production, only 21 per cent of the allocated catch came from those places. From this it would appear that cohos prefer the more northerly streams of the inlet, and that the closed season of 10 days in August has restricted the catch in waters south of the Forelands. No evidence of depletion of this species can be seen.

TABLE 33.—*Graphic table showing catch of coho salmon, Cook Inlet, 1906–1927*

[Each letter represents 10,000 fish]

Year	Catch
1906	XXXXXXXXXX
1907	XXXXXXXXXXXXXXXXX
1908	XXXXXXXXXX
1909	XXXXXXXXX
1910	XXXXXXXX
1911	XXXXXXXXX
1912	XXXXXXX
1913	XXXXXXXX
1914	XXXXXXXXXXXXXXXXX
1915	XXXXXXXXXXXX
1916	XXXXXXXXXXXXXXXXXXXX
1917	XXXXXX
1918	XXXXXXXXXXXXXXXXXXXXXXXX
1919	XXXXXXXXXXXXX
1920	XXXXXXXXXXXXXXXXXXXXXXXXXXX
1921	XX
1922	XXXXXXXXXXXXXXXXXX
1923	XXXXXXXXXXXXX
1924	XXXXXXXXXXXXXXXX
1925	XXXXXXXXXXXXXXXXXX
1926	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1927	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

CHUM SALMON

The first recorded catch of chums in Cook Inlet was made in 1910. The history since then is shown graphically in Table 34. In the first nine years, the bulk of the catch was unallocated so that consideration need be given only to the number taken annually since 1918, except to mention that in 1912 and in 1916 the catch was more than 100,000. In 1918, it again exceeded that figure, but by a very narrow margin. Larger catches in the even years were followed by smaller ones in the odd years, the peaks becoming lower and the depressions deeper until in 1925 only 15,064 were caught—the smallest production in 12 years. In 1926, the catch rose sharply to approximately 120,000, an increase not unlike those shown in the catches of cohos, kings, and reds, but it was followed by a drop to 59,380 in 1927. The marked downward trend from 1916 to 1925 might well be considered as evidence of serious depletion, were it not for the sudden increase in the catch that occurred in 1926. As it is, it is not possible to state whether this species has been reduced in abundance or not, but, in view of the fact that none of the other species show clear evidence of depletion, it seems safe to assume that the same thing is true of the chums. If the size of the run in any year is reflected in the number of chums caught, it is at once apparent that the chum resources of Cook Inlet are economically unimportant, and that all reported catches were chiefly incidental to fishing for other species. Chums coming mainly from waters of the east shore south of Anchor Point, through Chinitna Bay, Tuxedni Harbor, Tyonek, and Three Mile Creek on the west shore have produced fair quantities in a few seasons. As a whole, this fishery holds little promise of much larger development. There may be localities in which moderately good catches will continue to be made, but there is no indication that any of them will be found in the northern sections of the inlet.

TABLE 34.—*Graphic table showing catch of chum salmon, Cook Inlet, 1910 to 1927*

[Each figure represents 5,000 fish]

Year	Catch
1910	X
1911	X
1912	XXXXXXXXXXXXXXXXXXXXXXXX
1913	XXX
1914	XXXXXXXX
1915	XXXXXX
1916	XXXXXXXXXXXXXXXXXXXXXXXXX
1917	XXXXXXXXXXXXXXX
1918	XXXXXXXXXXXXXXXXXXXX
1919	XXXXXXXXXX
1920	XXXXXXXXXXXXXXXXXX
1921	XXXXXXXX
1922	XXXXXXXXXXXXXX
1923	XXXXX
1924	XXXXXXX
1925	XXX
1926	XXXXXXXXXXXXXXXXXXXXXX
1927	XXXXXXXXXXX

RESURRECTION BAY DISTRICT

This district embraces Resurrection Bay exclusively. The fishery districts nearest to it are Prince William Sound on the east and Cook Inlet on the west. In both directions, especially to the westward, are miles of coastal waters that have no salmon fisheries, so that this bay stands as a district wholly apart from any other, and it is quite certain that what is here shown as the catch came from runs belonging strictly to these waters. The figures are given in Table 35.

Aside from a few small precipitous streams that attract coho salmon, Resurrection Bay has three fairly large tributaries entering at its head—Resurrection River, Bear Creek, and one stream unknown by name except to local residents. These larger streams are the chief source of the salmon supply of this district. Bear Creek is undoubtedly the largest producer of red salmon, and perhaps of the other species, though Resurrection River is a much larger stream. The river is a rough, glacial stream, whereas Bear Creek is lake fed, less tumultuous, and provides larger areas for spawning beds.

In late years, fishing has been entirely with gill nets, though in the earlier history of the fishery both beach and purse seines were used and in one season a trap was driven near Kanes Head on the west side of the bay about 8 miles south of Seward, but it caught very few salmon.

TABLE 35.—*Salmon catch and fishing appliances used in the Resurrection Bay district, 1911 to 1927*

Year	Coho	Chum	Pinks	King	Red	Beach seines		Purse seines		Gill nets		Pile traps
						Number	*Fathoms*	*Number*	*Fathoms*	*Number*	*Fathoms*	*Number*
1911	2,665	78	256	40	2,340			1	16	2	150	
1912	2,365	722	350	810	16,220					7	400	
1913	2,365	255			1,857					4	200	
1914	3,606		2,948	200	5,500					6	259	
1915	7,880		800	30	9,650	1	125			14	680	
1916	4,300				2,340	1	85			7	360	
1917	3,388	134	631	45	29,050					9	600	
1918	11,130	5,463	4,988	19	39,670	4	300			26	2,190	1
1919	24,939	1,444	5,633	389	26,690			3	420	36	2,810	
1920	19,095	79	541	339	23,834			2	190	24	1,800	
1921	7,592			38	24,773			1	115	15	1,050	
1922	1,883				12,154			1	85	14	840	
1923	6			8	17,740					14	800	
1924	4,300			57	14,984					14	840	
1925	14				3							
1926	6,635	121	17		21,215					18	1,800	
1927	9,072				2,521					14	1,120	

This district produces a small run of reds and cohos. All other species have been taken, but the catches were decidedly irregular. Since 1920, the catch of other species has been extremely small, and in most of the years none at all.

Efforts were made to build up a larger run here by artificial propagation and by clearing the streams of obstructions to make larger and better areas available for spawning fish, but the runs continue to be small and the possibility of developing a much larger fishery in this district than now exists seems remote.

A cannery was built at Seward in 1917 and was operated each season through 1921. These five years cover the most productive period of the Resurrection Bay salmon fisheries, and they also represent the period of most intensive fishing. Fishing in these years demonstrated conclusively that the supply of fish was insufficient for the profitable operation of a cannery, and that the runs gave little promise of ever becoming profitable.