

16.—THE SALMON FISHERIES OF THE COLUMBIA RIVER BASIN.

BY MARSHALL McDONALD,
United States Commissioner of Fish and Fisheries.

U. S. COMMISSION OF FISH AND FISHERIES,
Washington, D. C., May 31, 1894.

Hon. ADLAI E. STEVENSON,
President of the Senate:

SIR: In compliance with instructions conveyed in the provisions of the Sundry Civil Bill, which became a law August 5, 1892, I have the honor to submit a report of investigations in the Columbia River Basin.

The first of the provisions above referred to authorized the expenditure from the appropriation for inquiry respecting food-fishes of \$2,000, or so much thereof as may be necessary, "In examining the Clarke's Fork of the Columbia River, with the view to ascertain the obstructions which prevent the ascent of salmon up said river to the Flathead Lake and adjacent waters."

The second provision directed an investigation and report respecting the advisability of establishing a fish-hatching station at some suitable point in the State of Washington, and appropriated for the same "\$1,000, or as much thereof as may be necessary."

It was not known whether the failure of the salmon to enter the Clarke Fork of the Columbia was due to natural obstructions preventing their ascent, or was to be attributed to the extensive fishing operations prosecuted in the Lower Columbia, or possibly to other causes to be disclosed by the proposed investigation. Again, the location of the hatchery proposed for the State of Washington would be necessarily determined by our ability to secure an adequate supply of spawning salmon within convenient distance of the hatchery.

It appearing probable that the methods of the large fisheries pursued in the Lower Columbia, if permitted to continue, would effectually intercept the run of salmon to the headwaters, and thus defeat the object for which the hatchery is proposed, it was thought proper and expedient to institute a general investigation covering the entire Columbia River Basin, and if conditions were disclosed threatening disaster to these valuable and productive fisheries, to bring the matter to the attention of Congress and the States interested in their prosperity.

The direction of the field investigation was intrusted to Prof. B. W. Evermann, assistant in the Division of Inquiry Respecting Food-Fishes, whose report is appended to and constitutes an integral part of the report of the Commissioner of Fisheries.

NOTE.—This paper was first issued August 27, 1894, as Senate Miscellaneous Document No. 200, Fifty-third Congress, second session.

A very complete statistical investigation into the history, methods, apparatus, present conditions, product, and annual value of the salmon fisheries of the Columbia has also been made by Mr. W. A. Wilcox, under the direction of Dr. H. M. Smith, assistant in charge of the Division of Statistics and Methods of the Fisheries, the results of which are embodied and discussed in the report which is herewith respectfully submitted.

CONDITIONS DETERMINING THE SALMON PRODUCTION OF A RIVER BASIN.

There are fundamental conditions determining the salmon production of a river basin and the nature and extent of the fisheries which may be maintained without overtaxing the productive capacity of the river. All the species of salmon which are the object of the fisheries are alike under the constraint of a natural law, which compels them to enter the fresh waters for the purpose of spawning. Some species ascend to a relatively short distance above tide water. Others, like the chinook, push their migrations to the remotest sources of the rivers and tributary streams, when not prevented by natural or artificial obstructions. Where the area of distribution is contracted by the erection of barriers, dams, or other obstructions which the salmon can not surmount, the production of the river is diminished *pro tanto*, for the reason that the young salmon remain for some months in the waters in which they are hatched—they must here find their food—and consequently the extent of the feeding-grounds open to them will be the measure of nature's ability to repair the waste occasioned by natural casualties and the fishing operations. If there be no contraction of the breeding area by artificial obstructions, but, on the other hand, the times, methods, and apparatus of the fisheries are such as to intercept or in a large measure prevent the run of salmon into and up the rivers, then a serious decline in the fisheries is inevitable.

It is possible by fish-cultural operations pursued on an adequate scale, by hatching and planting the fry in the head waters of the Columbia and its tributary streams, to realize the full productive capacity of the river, so long as eggs can be obtained in sufficient numbers to furnish a basis for the extensive operations required. This would not be possible, however, if the fishing operations in the lower river practically excluded the salmon from the streams to which it would be necessary to have recourse to obtain a supply of eggs. It is evident, therefore, that fish-cultural operations can not be relied upon exclusively or chiefly to maintain the salmon supply in the Columbia. The regulation of the times, methods, and apparatus of the fisheries should be such as to assure the largest opportunity practicable for reproduction under natural conditions. Artificial propagation should be invoked as an aid and not as a substitute for reproduction under natural conditions.

THE LIMITS OF MIGRATION OF SALMON.

The limits of migration of salmon in the Columbia River basin, as determined by impassable falls in the larger tributaries of the Columbia and their affluents, is shown in the accompanying chart, there being no serious obstructions existing in the main river within the limits of the United States.

The area of distribution is approximately 90,000 square miles. This immense tract is drained by innumerable streams of clear cold water, into which the salmon enter for the purpose of spawning and up which they ascend till their progress is stopped

by falls or other obstructions which they cannot surmount. These waters furnish the feeding-grounds of the young salmon during their early life, which is spent in the fresh waters. Their migration seaward does not begin until they are at least a year old and have attained a length of from 8 to 10 inches. These streams are the nurseries of the great salmon fisheries of the lower Columbia. From each goes out every year a colony, more or less numerous, to swell the aggregate of young salmon necessary to repair the waste by natural casualty and by capture.

The area of natural distribution has not as yet been very materially abridged. Certain streams, such as the Bruneau and the Boise, have been obstructed by dams near their mouths, but the vast extent of waters still accessible to salmon and affording suitable breeding and feeding grounds, indicates that we must look to other causes to explain any ascertained deterioration in the salmon fisheries of the Columbia.

DECREASE OF SALMON IN THE HEAD WATERS OF THE COLUMBIA RIVER.

The investigations made by Prof. Evermann and the parties under his direction establish conclusively the fact that there has been a very great reduction in the number of salmon frequenting the head waters of the Columbia River and its tributaries. This decrease is more notable in the main river. In the early history of the fishery salmon were found in the head waters in marvelous abundance. According to the information obtained by Prof. Evermann:

They were abundant in the Columbia River at Kettle Falls as late as 1878. Since then there has been a great decrease. They have been scarce since 1882. Since 1890 there have been scarcely any at Kettle Falls. The Meyers Brothers say that they have been almost unable to buy any salmon for their own table from the Indians for three years. Certain Indians with whom we talked at Kettle Falls said salmon were once very abundant there, but that very few are seen now. Other persons testified to the same effect. Essentially the same information was obtained regarding the decrease of salmon in other parts of the upper tributaries of the Columbia, viz: at Spokane, in both the Big and Little Spokane rivers, and in the Snake River and its various tributaries.

Dr. O. P. Jenkins, an assistant of Prof. Evermann, makes the following report in reference to the Yakima River, Washington:

The Yakima is the main stream of the valley. It receives many tributaries, the main ones being Manistash and Wilson creeks. The river near the city (Ellensburg) is 160 feet wide, by an average of 10 feet deep, and flows with a velocity of 1 foot per second. Temperature at 9:15 a. m., August 24, 1893, 60° F.; water clear. Those acquainted with the facts state that formerly, up to about 1885, salmon of three or four kinds, including the quinnat, ran up the stream to this valley and spawned in the river in great numbers; at present very few make their appearance.

There is no reason to doubt—indeed, the fact is beyond question—that the number of salmon now reaching the head waters of streams in the Columbia River basin is insignificant in comparison with the number which some years ago annually visited and spawned in these waters. It is further apparent that this decrease is not to be attributed either to the contraction of the area accessible to them or to changed conditions in the waters which would deter the salmon from entering them. We must look to the great commercial fisheries prosecuted in the lower river for an explanation of this decrease, which portends inevitable disaster to these fisheries if the conditions which have brought it about are permitted to continue.

The relations of the decreased number of salmon in the head waters to the development of the commercial fisheries is brought out in a very instructive way by an analysis of the following table:

Summary of the salmon-canning industry of the Columbia River from its origin to the present time.

Year.	Gross weight of salmon utilized.	Number of cases packed.	Value.	Average value per case.	Year.	Gross weight of salmon utilized.	Number of cases packed.	Value.	Average value per case.
	<i>Pounds.</i>					<i>Pounds.</i>			
1866.....	260,000	4,000	\$64,000	\$16.00	1881.....	35,750,000	550,000	\$2,475,000	\$4.50
1867.....	1,170,000	18,000	288,000	16.00	1882.....	35,184,500	541,300	2,600,000	4.80
1868.....	1,820,000	28,000	392,000	14.00	1883.....	40,911,000	629,400	3,147,000	5.00
1869.....	6,500,000	100,000	1,350,000	13.50	1884.....	40,300,000	629,400	2,915,000	4.70
1870.....	9,750,000	150,000	1,800,000	12.00	1885.....	35,997,000	553,800	2,500,000	4.51
1871.....	13,000,000	200,000	2,100,000	10.50	1886.....	29,152,000	448,500	2,135,000	4.76
1872.....	16,250,000	250,000	2,325,000	9.30	1887.....	23,140,000	356,000	2,124,000	5.97
1873.....	16,250,000	250,000	2,250,000	9.00	1888.....	24,211,005	372,477	2,327,981	6.25
1874.....	22,750,000	350,000	2,625,000	7.50	1889.....	20,685,495	309,885	1,809,820	5.84
1875.....	24,375,000	375,000	2,250,000	6.00	1890.....	28,781,385	435,774	2,407,456	5.52
1876.....	29,250,000	450,000	2,475,000	5.50	1891.....	29,450,635	398,953	2,240,964	5.62
1877.....	24,700,000	380,000	2,052,000	5.40	1892.....	32,185,995	487,338	2,679,009	5.50
1878.....	29,000,000	460,000	2,300,000	5.00	1893.....	24,050,000	370,000	2,107,500	5.70
1879.....	31,200,000	480,000	2,640,000	5.50					
1880.....	34,450,000	530,000	2,650,000	5.00	Total.	658,424,515	10,098,427	59,029,790	5.85

Canning operations on the Columbia River began in 1866, when 4,000 cases were packed and sold at an average of \$16 per case. As early as 1872 the total pack reached 250,000 cases, the price per case having declined to \$9. Each succeeding year operations were extended and reached their culmination in 1883 and 1884, when upwards of 600,000 cases were packed each season. From this time on the catch declined, having reached its lowest point in 1889, the number of cases packed that season being 309,885, or less than half the number of cases packed in 1883 and 1884.

Up to 1888, practically the entire pack consisted of the king or chinook salmon, and the fishing season did not extend beyond the first of August. In 1889 the packers began canning bluebacks and steelheads to make up the deficiency in the supply, and extended their operations to the first of September.

DETAILED STATISTICS OF THE SALMON INDUSTRY OF THE COLUMBIA RIVER, 1889-92.

The following series of tables shows, in some detail, the extent of the salmon fishery and canning industry of the Columbia River during the years 1889 to 1892, inclusive, as determined by the inquiries conducted by this Commission.

The number of fishermen and shore employes connected with the salmon industry in each of the years named is indicated in Table A:

A.—Table showing the number of persons employed in the salmon industry of the Columbia River from 1889 to 1892.

How engaged.	1889.	1890.	1891.	1892.
<i>Oregon:</i>				
Fishermen.....	1,606	1,648	1,029	2,064
Shoresmen and cannery employes.....	870	1,028	1,057	1,100
Total.....	2,476	2,712	2,986	3,164
<i>Washington:</i>				
Fishermen.....	1,535	1,510	1,575	1,677
Shoresmen and cannery employes.....	594	602	654	704
Total.....	2,129	2,112	2,229	2,381
<i>Total for river:</i>				
Fishermen.....	3,141	3,158	2,604	3,741
Shoresmen and cannery employes.....	1,404	1,630	1,711	1,804
Total.....	4,545	4,788	4,315	5,545

The number and value of boats and apparatus and the value of shore property and capital employed in the salmon fisheries of the Columbia River in 1889, 1890, 1891 and 1892 is given in Table B.

B.—Number and value of boats and apparatus, and the value of shore property, and cash capital employed in the salmon industry of the Columbia River in 1889, 1890, 1891, and 1892.

Apparatus and capital.	1889.		1890.		1891.		1892.	
	No.	Value.	No.	Value.	No.	Value.	No.	Value.
Oregon:								
Boats	751	\$99,850	776	\$104,400	876	\$120,815	998	\$131,550
Pile-drivers and scows.....	21	5,900	23	6,300	30	8,300	29	7,400
Pound nets	102	72,300	98	76,500	140	98,900	247	173,400
Trap nets	2	1,600	.....	.....	2	1,600	2	1,600
Seines	7	4,800	6	2,700	19	11,150	12	5,650
Gill nets	757	152,000	700	159,450	790	181,265	861	190,100
Wheels	31	120,052	29	107,552	30	108,152	40	132,852
Dip nets and squaw nets ..	95	475	85	425	60	300	50	250
Shore property .....	.....	502,955	.....	486,355	.....	455,205	.....	507,805
Cash capital .....	.....	395,000	.....	581,000	.....	520,000	.....	614,000
Total .....	.....	1,354,932	.....	1,524,682	.....	1,505,687	.....	1,704,607
Washington:								
Boats	475	60,340	468	59,780	534	67,280	538	64,895
Pile-drivers and scows.....	39	9,050	37	9,950	42	10,750	45	13,550
Pound nets	62	49,200	70	55,200	98	77,000	131	103,400
Trap nets	2	1,400	2	1,400	2	1,400	1	700
Seines	33	18,700	29	16,400	30	16,900	26	10,000
Gill nets	436	88,775	432	89,480	472	101,780	453	98,130
Wheels	9	25,000	12	48,500	14	45,000	17	49,100
Dip nets and squaw nets ..	15	75	18	90	23	115	25	125
Shore property .....	.....	245,950	.....	247,280	.....	321,050	.....	282,800
Cash capital .....	.....	304,000	.....	331,000	.....	332,000	.....	330,000
Total .....	.....	801,490	.....	859,080	.....	973,275	.....	952,700
Total for river:								
Boats	1,226	160,190	1,244	164,180	1,410	188,095	1,536	196,445
Pile-drivers and scows.....	60	14,950	60	16,250	72	19,050	74	20,950
Pound nets	164	120,500	168	131,700	238	175,900	378	276,800
Trap nets	4	3,000	2	1,400	4	3,000	3	2,800
Seines	40	23,500	35	19,100	49	28,050	38	15,650
Gill nets	1,193	249,775	1,192	248,930	1,262	289,045	1,314	288,230
Wheels	40	145,052	41	156,052	44	153,152	57	181,052
Dip nets and squaw nets ..	110	550	103	515	83	415	75	375
Shore property .....	.....	748,905	.....	733,635	.....	776,255	.....	790,605
Cash capital .....	.....	699,000	.....	912,000	.....	852,000	.....	944,000
Total .....	.....	2,156,422	.....	2,383,762	.....	2,478,902	.....	2,717,307

Comparing 1892 with 1889, we find increases or decreases in the number of the different sorts of apparatus as follows:

Apparatus.	1889.	1892.	Increase.	Decrease.
Pound nets	164	378	214	.....
Seines	40	38	.....	2
Gill nets	1,193	1,314	121	.....
Wheels	40	57	17	.....
Dip nets and squaw nets ..	110	75	.....	35

The following tables, C, D, E, and F, show by apparatus the number, weight, and value of each species of salmon taken in the Columbia River in 1889, 1890, 1891, and 1892:

C.—Table showing by apparatus the number, weight, and value of each species of salmon taken in the Columbia River in 1889.

Apparatus and species.	Oregon.			Washington.			Total.		
	No.	Pounds.	Value.	No.	Pounds.	Value.	No.	Pounds.	Value.
Pound nets:									
Chinook	86,777	2,169,425	\$108,469	40,323	1,008,075	\$50,353	127,100	3,177,500	\$158,822
Blueback	33,372	166,860	8,342	24,199	120,995	5,904	57,571	287,855	14,246
Steelhead	37,958	379,545	11,386	22,460	224,600	6,737	60,418	604,145	18,123
Total	158,107	2,715,830	128,197	86,982	1,353,670	62,994	245,089	4,069,500	191,191
Trap nets:									
Chinook	710	17,750	887	2,275	56,875	2,844	2,985	74,625	3,731
Steelhead	440	4,400	132	803	8,030	241	1,243	12,430	373
Total	1,150	22,150	1,019	3,078	64,905	3,085	4,228	87,055	4,104
Seines:									
Chinook	24,752	618,200	30,940	63,782	1,594,550	79,727	88,534	2,213,350	110,667
Blueback	3,500	17,500	875	2,444	12,225	611	5,944	29,725	1,486
Steelhead	16,720	167,200	4,816	43,978	439,780	13,193	60,698	606,980	18,009
Total	44,972	803,500	36,631	110,204	2,046,555	93,531	155,176	2,850,055	130,162
Gill nets:									
Chinook	252,044	6,301,325	312,563	226,053	5,759,050	281,470	478,097	12,060,375	594,033
Blueback	27,623	139,115	4,751	17,218	86,090	3,044	44,841	225,205	7,795
Steelhead	16,472	164,720	5,090	15,970	159,700	4,785	32,442	324,420	9,875
Total	296,139	6,605,160	322,404	259,241	6,004,840	289,299	555,380	12,610,000	611,703
Wheels:									
Chinook	15,182	379,550	12,867	6,876	171,900	6,078	22,058	551,450	19,845
Blueback	140,090	700,450	23,090	51,064	230,322	9,260	191,154	930,772	32,350
Steelhead	6,329	63,290	2,043	1,480	14,800	484	7,609	78,090	2,527
Silver	4,500	31,500	630	2,540	16,780	503	7,040	48,280	1,133
Total	166,101	1,174,790	38,630	61,960	433,802	17,225	228,061	1,068,592	55,855
Dip nets and squaw nets:									
Chinook	2,291	57,283	1,146	1,360	34,000	510	3,651	91,283	1,656
Blueback	16,910	84,550	1,841	8,112	40,560	608	25,022	125,110	2,449
Steelhead	1,145	11,450	229	509	5,090	77	1,654	16,540	306
Silver	5,142	35,994	540	3,175	22,225	333	8,317	58,219	873
Total	25,488	189,277	3,756	13,156	101,875	1,528	38,644	291,152	5,284
All apparatus:									
Chinook	381,756	9,544,133	466,872	340,669	8,024,450	421,882	722,425	18,168,583	888,754
Blueback	221,495	1,108,475	38,899	103,037	490,192	19,427	324,532	1,598,667	58,326
Steelhead	79,064	790,605	23,696	85,200	852,000	25,517	164,264	1,042,605	49,213
Silver	9,642	67,494	1,170	5,715	39,065	836	15,357	106,499	2,006
Total	691,957	11,510,707	530,637	534,621	10,005,647	467,662	1,226,578	21,516,354	998,299

D.—Table showing by apparatus the number, weight, and value of each species of salmon taken in the Columbia River in 1890.

Apparatus and species.	Oregon.			Washington.			Total.		
	No.	Pounds.	Value.	No.	Pounds.	Value.	No.	Pounds.	Value.
Pound nets:									
Chinook.....	104,099	2,602,475	\$78,491	71,346	1,783,659	\$53,510	175,445	4,386,125	\$132,001
Blueback.....	50,493	252,465	5,048	42,097	210,485	4,209	92,590	462,950	9,257
Steelhead.....	51,600	516,000	5,160	41,412	414,120	4,140	93,012	930,120	9,300
Total.....	206,192	3,370,940	88,609	154,855	2,408,255	61,859	361,047	5,779,105	150,558
Trap nets:									
Chinook.....				3,629	60,725	2,721	3,629	90,725	2,721
Blueback.....				303	1,515	30	303	1,515	30
Steelhead.....				2,979	29,790	298	2,979	29,790	298
Total.....				6,911	122,030	3,049	6,911	122,030	3,049
Seines:									
Chinook.....	10,750	268,750	8,063	53,752	1,343,800	41,402	64,502	1,612,550	49,465
Blueback.....	2,250	11,250	225	14,292	71,460	1,425	16,542	82,710	1,650
Steelhead.....	9,013	90,130	901	36,701	367,010	3,669	45,714	457,140	4,570
Total.....	22,013	370,130	9,189	104,743	1,782,270	46,496	126,758	2,152,400	55,685
Gill nets:									
Chinook.....	369,196	9,229,700	288,730	211,675	5,366,675	168,167	580,371	14,596,375	454,897
Blueback.....	81,909	409,545	8,440	25,718	138,590	2,884	107,627	548,135	11,324
Steelhead.....	29,593	295,935	3,819	18,635	186,350	2,467	48,228	482,285	6,286
Total.....	480,698	9,935,180	300,989	256,028	5,691,615	171,518	736,226	15,626,795	472,507
Wheels:									
Chinook.....	83,202	2,080,053	62,401	27,972	699,317	20,979	111,174	2,779,370	83,380
Blueback.....	529,646	2,648,155	79,444	207,298	1,036,465	30,431	736,044	3,684,620	109,875
Steelhead.....	71,239	712,390	16,474	13,801	138,010	2,322	85,040	850,400	18,796
Silver.....	4,660	31,612	749	1,500	10,500	210	6,160	42,112	959
Total.....	688,747	5,472,210	150,068	250,571	1,884,292	53,942	930,318	7,356,502	213,010
Dip nets and squaw nets:									
Chinook.....	5,021	125,534	1,958	2,242	56,068	841	7,263	181,602	2,799
Blueback.....	32,748	163,740	2,450	7,717	38,585	579	40,465	202,325	3,029
Steelhead.....	11,000	110,000	1,650	1,402	14,025	210	12,402	124,025	1,860
Silver.....	10,180	71,260	1,068	4,500	31,500	472	14,080	102,760	1,540
Total.....	58,949	470,534	7,126	15,861	140,178	2,102	74,810	610,712	9,228
All apparatus:									
Chinook.....	572,268	14,306,512	430,643	370,610	9,340,235	285,620	942,884	23,646,747	725,263
Blueback.....	697,046	3,485,155	95,607	297,425	1,497,100	39,558	994,471	4,982,255	135,165
Steelhead.....	172,445	1,724,455	28,004	114,030	1,140,305	13,105	287,375	2,873,760	41,110
Silver.....	14,840	102,872	1,817	6,000	42,000	682	20,840	144,872	2,490
Total.....	1,456,599	19,618,994	565,071	788,971	12,028,640	338,966	2,245,570	31,647,634	904,037

E.—Table showing by apparatus the number, weight, and value of each species of salmon taken in the Columbia River in 1891.

Apparatus and species.	Oregon.			Washington.			Total.		
	No.	Pounds.	Value.	No.	Pounds.	Value.	No.	Pounds.	Value.
Pound nets:									
Chinook.....	108,983	2,724,575	\$108,983	94,624	2,365,600	\$94,594	203,607	5,090,175	\$203,577
Blueback.....	22,988	114,940	2,298	52,164	260,840	5,336	75,152	375,780	7,634
Steelhead.....	54,080	540,800	7,029	44,448	444,464	6,308	98,528	985,264	13,937
Total.....	186,051	3,380,315	118,310	191,236	3,070,904	106,238	377,287	6,451,219	224,548
Trap nets:									
Chinook.....	630	15,750	630	712	17,800	712	1,342	33,550	1,342
Blueback.....	148	740	15				148	740	15
Steelhead.....	786	7,800	118	501	5,010	75	1,287	12,870	193
Total.....	1,564	24,350	763	1,213	22,810	787	2,777	47,160	1,550
Seines:									
Chinook.....	16,489	412,225	16,489	48,596	1,214,900	36,884	65,085	1,627,125	53,373
Blueback.....	2,252	11,260	225	8,325	41,625	1,221	10,577	52,885	1,446
Steelhead.....	5,092	50,920	919	27,469	274,690	5,467	32,561	325,610	6,388
Silver.....	857	5,999	190				857	5,999	190
Total.....	24,690	480,404	17,823	84,390	1,531,215	43,572	109,080	2,011,619	61,395
Gill nets:									
Chinook.....	448,500	11,212,500	447,031	208,633	5,341,525	208,593	657,133	16,554,025	655,624
Blueback.....	25,679	131,595	4,102	15,268	76,340	2,589	40,947	207,735	6,691
Steelhead.....	17,274	172,740	3,541	20,581	205,815	3,408	37,855	378,555	7,009
Silver.....	285	1,995	60	694	4,858	145	979	6,853	205
Total.....	491,738	11,518,630	454,734	245,176	5,628,538	214,795	736,914	17,147,168	669,529
Wheels:									
Chinook.....	23,645	561,153	17,735	9,621	240,540	7,216	33,266	831,693	24,951
Blueback.....	80,004	400,020	12,000	36,675	183,375	5,502	116,679	583,395	17,502
Steelhead.....	27,053	270,530	6,675	11,536	115,360	3,460	38,589	385,890	10,135
Silver.....	4,920	34,440	933	2,730	19,110	573	7,650	53,550	1,506
Total.....	135,622	1,296,143	37,343	60,562	558,385	16,751	196,184	1,854,528	54,004
Dip nets and squaw nets:									
Chinook.....	2,943	73,591	1,119	403	10,083	151	3,346	83,674	1,270
Blueback.....	30,436	152,182	2,388	13,887	60,912	914	44,323	213,100	3,302
Steelhead.....	7,459	74,590	1,149	2,016	20,164	302	9,475	94,754	1,451
Silver.....	10,370	72,591	1,089	4,260	29,820	447	14,030	102,411	1,536
Total.....	51,208	372,954	5,745	20,566	120,985	1,814	71,774	493,939	7,559
All apparatus:									
Chinook.....	601,190	15,029,794	591,987	362,589	9,190,448	348,150	963,779	24,220,242	940,137
Blueback.....	161,507	810,537	21,028	126,319	623,098	15,562	287,826	1,433,635	36,590
Steelhead.....	111,744	1,117,440	19,431	106,551	1,065,503	19,080	218,205	2,182,943	38,511
Silver.....	10,482	115,025	2,272	7,684	53,788	1,165	24,116	108,813	3,437
Total.....	890,873	11,072,796	634,718	603,143	10,932,837	383,957	1,494,016	28,005,633	1,018,675

F.—Table showing by apparatus the number, weight, and value of each species of salmon taken in the Columbia River in 1892.

Apparatus and species.	Oregon.			Washington.			Total.		
	No.	Pounds.	Value.	No.	Pounds.	Value.	No.	Pounds.	Value.
Pound nets:									
Chinook.....	127,627	3,191,675	\$127,627	89,852	2,246,300	\$89,852	217,479	5,537,975	\$217,479
Blueback.....	99,602	498,010	10,010	191,222	956,110	19,122	290,824	1,454,120	29,132
Steelhead.....	112,661	1,126,610	16,899	76,998	769,980	11,549	189,659	1,896,590	28,448
Total.....	339,890	4,816,295	154,536	358,072	3,972,390	120,523	697,902	8,788,685	275,059
Trap nets:									
Chinook.....	530	13,250	530	20	500	20	550	13,750	550
Blueback.....	240	1,200	24				240	1,200	24
Steelhead.....	879	8,790	132	150	1,500	150	1,029	10,290	282
Total.....	1,649	23,240	686	170	2,000	170	1,819	25,240	856
Seines:									
Chinook.....	27,707	689,595	20,686	27,582	689,550	20,687	55,280	1,379,085	41,373
Blueback.....	48,347	237,735	7,132	75,031	375,185	11,256	123,378	612,920	18,388
Steelhead.....	18,544	185,352	3,707	34,843	348,430	6,069	53,387	533,782	10,670
Silver.....	1,428	10,000	300				1,428	10,000	300
Total.....	96,026	1,122,622	31,825	137,456	1,413,165	38,012	233,482	2,535,787	70,737
Gill nets:									
Chinook.....	355,715	8,892,870	355,715	223,197	5,715,675	223,167	578,912	14,608,545	578,882
Blueback.....	94,141	470,705	9,714	21,021	110,105	3,303	115,162	580,810	13,017
Steelhead.....	37,043	370,430	5,866	33,428	334,280	5,990	70,471	704,710	10,956
Silver.....				714	5,000	150	714	5,000	150
Total.....	486,899	9,734,005	371,295	278,360	6,165,060	231,710	765,259	15,899,065	603,005
Wheels:									
Chinook.....	45,964	1,149,115	34,474	10,705	417,630	12,529	62,669	1,566,745	47,003
Blueback.....	314,585	1,572,923	47,187	145,766	728,832	21,865	460,351	2,301,755	69,052
Steelhead.....	95,654	956,540	28,696	45,056	450,560	13,517	140,710	1,407,100	42,213
Silver.....	39,255	274,785	8,234	4,872	34,104	1,023	44,127	308,880	9,257
Total.....	495,458	3,953,363	118,591	212,399	1,631,126	48,934	707,857	5,584,489	167,525
Dipnets and squaw nets:									
Chinook.....	1,356	33,000	509	578	14,450	217	1,934	48,350	726
Blueback.....	59,023	295,109	4,427	15,380	76,900	1,154	74,403	372,009	5,581
Steelhead.....	6,780	67,802	1,017	2,800	28,900	434	9,670	96,702	1,451
Silver.....	12,386	86,703	1,301	4,850	33,950	510	17,236	120,653	1,811
Total.....	79,545	483,514	7,254	23,608	154,200	2,315	103,243	637,714	9,569
All apparatus:									
Chinook.....	558,899	13,970,345	539,541	357,934	9,084,105	346,472	916,833	23,054,450	886,013
Blueback.....	615,938	3,075,682	78,494	448,420	2,247,132	56,700	1,064,358	5,322,814	135,194
Steelhead.....	271,561	2,715,524	50,317	193,805	1,933,650	37,709	464,926	4,649,174	94,020
Silver.....	53,009	371,488	9,835	10,436	73,054	1,083	63,505	444,542	11,518
Total.....	1,499,407	20,133,039	684,187	1,010,155	13,337,941	442,564	2,509,622	33,470,980	1,126,751

The number and location of the salmon canneries operated on the Columbia River in the years 1889 to 1892 were as follows:

Location.	1889.	1890.	1891.	1892.	Location.	1889.	1890.	1891.	1892.
Oregon:					Washington:				
Astoria.....	8	8	8	8	Ilwaco.....	1	1	1	1
Clifton.....	1		1	1	Knappton.....			1	1
Maple Dell.....	1	1	1	1	Chinook.....	1	1	1	1
Warrendale.....	1	1	1	1	Pillar Rock.....	1	1	1	1
Dalles.....	1	1	1	1	Brookfield.....	1	1	1	1
Celilo.....		1			Waterford.....	1	1	1	1
Portland*.....				1	Eureka.....	1	1	1	1
Total.....	12	12	12	14	Cathlamet.....	1	1	1	1
					Bay View.....	1	1	1	1
					Eagle Cliff.....	1	1	1	1
					Total.....	9	9	10	10
					Grand total.....	21	21	22	21

* This cannery, on the Willamette River, received its fish from the Columbia River.

The proportion of each species of salmon in the salmon pack of the Columbia River from 1889 to 1892 is shown in Table G:

G.—Table showing by species the salmon pack of the Columbia River from 1889 to 1892.

States and species.	1889.		1890.		1891.		1892.	
	Cases.	Value.	Cases.	Value.	Cases.	Value.	Cases.	Value.
Oregon:								
Chinook	140,741	\$844,446	196,414	\$1,138,787	222,903	\$1,279,092	214,631	\$1,244,500
Blueback	15,979	90,628	53,351	268,104	10,859	58,816	51,106	287,984
Steelhead	11,692	49,899	26,608	106,432	15,584	62,236	45,403	181,612
Silver							4,176	20,880
Total	168,412	984,973	276,373	1,513,323	249,406	1,400,144	315,316	1,734,976
Washington:								
Chinook	125,956	755,736	139,190	807,300	130,944	759,474	129,636	751,888
Blueback	1,818	10,423	3,994	21,965	4,623	25,426	15,441	84,925
Steelhead	13,699	56,688	16,217	64,868	13,980	55,920	26,945	107,280
Silver								
Total	141,473	824,847	159,401	894,133	149,547	840,820	172,022	944,093
Total for river:								
Chinook	266,697	1,600,182	335,604	1,946,087	353,907	2,038,566	344,267	1,996,388
Blueback	17,797	101,051	57,345	290,069	15,482	84,242	66,547	372,909
Steelhead	25,391	108,587	42,825	171,300	29,564	118,156	72,348	288,892
Silver							4,176	20,880
Total	309,885	1,809,820	435,774	2,407,456	398,953	2,240,964	487,338	2,679,009

In 1893 the pack of chinook salmon amounted to 290,000 cases.

The extent to which the different species of salmon enter into the pack, and the variations in the proportions during the four years covered by the figures, are shown in the following table. It appears that in 1892 the percentage of chinook salmon canned was less and that of each of the other species greater than in any of the preceding years.

Percentage of each species of salmon in the salmon pack of the Columbia River from 1889 to 1892.

Species.	1889.	1890.	1891.	1892.
Chinook	86.06	77.01	88.71	70.64
Blueback	5.74	13.16	3.88	13.05
Steelhead	8.20	9.83	7.41	14.85
Silver .....				.86
Total	100.00	100.00	100.00	100.00

In discussing the data furnished by the foregoing tables and others which will follow, I will confine myself to the chinook salmon for the following reasons:

1. It is the most important species considered economically.
2. It is taken equally by all forms of apparatus.
3. Active fishing operations continue practically during the entire period of its sojourn in the river, and it is therefore the species which would be the first to feel the influence of excessive fishing.

These considerations do not apply with equal force to the other species, viz, the steelhead, the blueback, and the silverside, which are taken under similar conditions and at present constitute about one-fourth of the entire pack.

The spawning run of the steelhead takes place before fishing operations have begun on the river.

The spawning run of the silverside takes place after canning operations are concluded for the season, while the small size of the blueback gives it comparative immunity from capture by the gill nets, which take much the larger part of the king salmon.

Referring to Table G we find that the pack of the chinook or king salmon on the Columbia River in the years 1889, 1890, 1891, 1892, and 1893 was as follows:

	No. of cases.
1889.....	266,697
1890.....	335,604
1891.....	353,907
1892.....	344,267
1893.....	290,000

Or an average of 318,095 cases per annum.

In the previous five years, beginning with 1884, the pack of salmon, consisting almost entirely of chinook, was as follows:

	No. of cases.
1884.....	620,000
1885.....	553,800
1886.....	448,500
1887.....	356,000
1888.....	372,477

Or an average of 470,155 cases per annum.

It will be seen that in the five years beginning in 1884, the average pack per season was 152,060 cases in excess of the average pack of the five-year period beginning in 1889. During the latter period the amount of netting in use had been greatly increased, the fishing season extended, and the movement of the salmon into and up the river more completely intercepted.

Undoubtedly, for the reasons above stated, the proportion of the entire run of salmon caught was larger in the latter than in the former period of five years, which suggests that the decrease of salmon in the latter period compared is probably larger than is indicated by the difference in the average catch. There is no reason to doubt that this decrease is due to and inherent in the conditions under which the salmon fisheries of the river are now prosecuted, and that it will continue progressively so long as these conditions continue.

The lower average of the pack during the five-year period ending with 1893 is due to conditions interfering with and limiting natural reproduction during the period of 1884 to 1888, when access to the head waters was not impeded to the extent it now is by the fishing operations. The influence of the more effective exclusion of the salmon from their breeding-grounds for the last five years is yet to be disclosed. The seed for the harvest of the present year was sown in 1888 or 1889. What the extent of the harvest will be depends upon the opportunity that was afforded in these years for the salmon to reach their spawning-grounds.

For the ensuing five years we are powerless to influence conditions. What the production will be has been already determined, so far as we can influence it either by the regulation of the fisheries or by artificial propagation. There is every reason to apprehend that for the five years to come the average production of king salmon will be lower even than the average for the five years just passed. This is the penalty

that must be paid for the improvidence and total disregard of the conditions necessary to maintain supply which has characterized the operations of the salmon fishermen on the Columbia River.

ARTIFICIAL PROPAGATION OF SALMON ON THE COLUMBIA RIVER.

In 1888 the U. S. Fish Commission, by direction of Congress, established a salmon-hatching station on the Clackamas River, Oregon. The work done is given in the following table:

Statement showing the number of Quinnet salmon eggs collected and fry distributed from Clackamas Station since its organization by the U. S. Fish Commission to the close of the fiscal year 1893.

Fiscal year—	Eggs collected.	Eggs distributed.	Fry distributed.
1888-89.....	4,500,000		4,500,000
1889-90.....	4,314,000	1,000,000	2,766,475
1890-91.....	5,800,000	700,000	4,902,000
1891-92.....	2,036,000		1,332,400
1892-93.....	4,444,000		4,100,000
Total.....	21,154,000	1,700,000	17,000,875

NOTE.—The fry were all deposited in the Clackamas River. The 1,700,000 eggs were furnished to the Oregon fish commission and the fry produced were deposited in the Clackamas River.

This work was undertaken on the urgent solicitation of those concerned in the salmon fisheries of the Columbia River, who realized that their fisheries were being exhausted, and it was hoped that some compensation for the deficiency in natural reproduction could be made by artificial stocking and breeding. It is certain that this work has exercised some conservative influence upon the catch. It is doubtful, however, whether it has been on a sufficiently extensive scale to compensate for the damage resulting from the interference with natural reproduction by the operation of the fisheries.

THE FISHING-GROUNDS.

On the accompanying charts, the locations of the fishing-grounds resorted to by the fishermen using different kinds of apparatus are indicated, and the number and position of the fixed appliances operated in 1892 are shown.

The fishing-grounds of the Lower Columbia extend from the mouth of the river to Kalama. The apparatus employed consists of gill nets, pound nets, and haul seines.

The greater number of pound nets are located in Baker Bay, on the Washington side of the river and on the outside of Sand Island. They are not, however, confined to this region, but are located at every point of vantage on both sides of the river, from the mouth up to Kalama, a distance of 80 miles.

The haul seines are located either on the shores or flats, wherever a desirable location can be found.

The principal region of gill-net fishing extends from the mouth of the river to Cathlamet Bay, and covers, practically, the entire river outside of the limits of the pound nets. Other important areas of gill-net fishing are in Cordell channel, in the channel and back of the islands opposite Pillar Rock and Brookfield, and in the long reach of river from Puget Island to Eagle Cliff. Minor fishing operations are

conducted between Kalama and the Cascades, both in the river and its tributaries, such as the Willamette, the Cowlitz, etc. The fishing operations on the Upper Columbia, from the Cascades to the mouth of the Deschutes River, are conducted almost exclusively with salmon wheels, which are turned by the force of the current. These, when properly located and operated, constitute most effective engines of capture.

A careful examination of the charts giving the number and location of the different fishing apparatus will show how effectually the salmon are embarrassed or intercepted in their attempts to reach their spawning-grounds. It is not a matter of wonder that, under existing conditions, there has been a serious deterioration in the value of these fisheries. It is, indeed, a matter of surprise that any salmon have been able to elude the labyrinth of nets which bar their course to the Upper Columbia. It is hardly an exaggeration to state that the entire volume of this great river is strained through the meshes of the innumerable nets which occupy and obstruct every passageway to the spawning-grounds. It is certain that the continuation of these fisheries under present conditions will eventually result in rendering them unremunerative. It concerns alike the whole people of the State, as well as those directly interested in the fisheries, that such regulations of the times, methods, and apparatus of these fisheries should be established and enforced as are necessary to maintain supply.

THE FISHING SEASON.

It is a wise policy on the part of the State to encourage the largest catch that can be permitted consistent with maintenance of supply; to impose no unnecessary embarrassments or restrictions upon the enterprise of the fishermen, yet at the same time to insist upon such protective regulations and restraints as may be found necessary to prevent the serious impairment of an important industry by the operations of the fishermen. The fishermen themselves, who have such important interests at stake and the security and profit of whose large investments depend upon the maintenance of the salmon supply, should be prompt to propose and vigilant to enforce such regulations as may be necessary to this end. The nature of the protective regulations which can be enforced with the least restraint or embarrassment to the salmon fisheries and the canning industries is indicated by reference to the following table, showing by months the number and weight of each species of salmon taken for canning on the Columbia River.

Table showing by months the number and weight of each species of salmon utilized for canning purposes on the Columbia River in 1889, 1890, 1891, and 1892.

Years and months.	Chinook salmon.		Blueback salmon.		Steelhead salmon.		Silver salmon.		Total.	
	Number of fish.	Gross weight.	Number of fish.	Gross weight.	Number of fish.	Gross weight.	Number of fish.	Gross weight.	Number of fish.	Gross weight.
		<i>Pounds.</i>		<i>Pounds.</i>		<i>Pounds.</i>		<i>Pounds.</i>		<i>Pounds.</i>
1889—April.....	89, 266	2, 231, 650	36, 676	183, 380	9, 408	94, 080	.....	.....	135, 350	2, 509, 110
May.....	156, 117	3, 992, 925	76, 517	382, 585	14, 709	147, 090	.....	.....	247, 343	4, 432, 600
June.....	168, 959	4, 223, 975	82, 453	412, 265	62, 695	626, 900	.....	.....	314, 107	5, 239, 100
July.....	301, 254	7, 535, 350	36, 717	183, 585	76, 166	761, 660	.....	.....	414, 137	8, 480, 505
Total.....	715, 596	17, 893, 900	232, 363	1, 161, 815	162, 078	1, 629, 780	.....	.....	1, 110, 937	20, 685, 495
1890—April.....	32, 727	818, 175	63, 180	315, 800	11, 005	110, 050	.....	.....	106, 912	1, 244, 125
May.....	230, 776	5, 919, 400	202, 580	1, 012, 900	22, 983	229, 830	.....	.....	462, 339	7, 162, 130
June.....	252, 754	6, 318, 850	297, 234	1, 486, 170	87, 567	875, 670	.....	.....	637, 555	8, 680, 690
July.....	357, 183	8, 932, 575	150, 299	751, 495	139, 596	1, 395, 960	.....	.....	647, 078	11, 080, 030
August.....	13, 941	348, 525	22, 107	110, 535	15, 535	155, 350	.....	.....	51, 583	614, 410
Total.....	893, 381	22, 337, 525	735, 400	3, 677, 000	276, 680	2, 796, 860	.....	.....	1, 905, 467	28, 781, 385
1891—April.....	82, 413	2, 060, 325	17, 437	87, 185	5, 178	51, 780	.....	.....	105, 028	2, 199, 290
May.....	184, 090	4, 502, 250	55, 229	276, 145	13, 314	133, 140	.....	.....	252, 633	4, 911, 535
June.....	223, 964	5, 599, 100	83, 743	418, 715	52, 676	526, 760	.....	.....	360, 383	6, 544, 575
July.....	398, 247	9, 956, 175	32, 389	161, 945	97, 900	979, 000	.....	.....	528, 536	11, 097, 120
August.....	58, 670	1, 466, 750	3, 701	18, 505	21, 286	212, 800	.....	.....	83, 057	1, 698, 115
Total.....	947, 384	23, 584, 600	192, 499	962, 495	190, 354	1, 903, 540	.....	.....	1, 330, 237	26, 450, 635
1892—April.....	55, 021	1, 375, 525	86, 449	432, 245	10, 503	105, 030	.....	.....	151, 973	1, 912, 800
May.....	187, 492	4, 687, 300	308, 946	1, 544, 730	32, 795	327, 950	.....	.....	529, 233	6, 559, 980
June.....	239, 498	5, 987, 450	330, 558	1, 652, 790	141, 194	1, 411, 940	.....	.....	711, 200	9, 052, 180
July.....	343, 421	8, 585, 525	128, 043	640, 215	199, 333	1, 993, 330	.....	.....	670, 797	11, 219, 070
August.....	84, 124	2, 103, 100	19, 110	95, 550	52, 991	529, 910	.....	.....	156, 225	2, 728, 560
September.....	.....	.....	.....	.....	11, 293	112, 930	19, 489	136, 423	30, 782	249, 353
October.....	.....	.....	.....	.....	22, 629	226, 290	33, 966	237, 702	56, 595	464, 052
Total.....	909, 556	22, 738, 900	873, 106	4, 365, 530	470, 738	4, 707, 380	53, 455	374, 185	2, 306, 855	32, 185, 995

In 1889 the fishing season extended from the 1st of April to the 31st of July. The total catch of chinook salmon amounted to 17,893,900 pounds, 87½ per cent of this amount being taken in May, June, and July, and 12½ per cent during the month of April.

In 1890 the fishing extended from April 10 to August 10, inclusive, and yielded a total product of 22,337,525 pounds of chinook salmon. Of this amount, 94½ per cent was taken in May, June, and July, and 1½ per cent during April and August.

In 1891 the fishing season extended from April 10 to August 10, inclusive, the total product of chinook salmon being 23,584,600 pounds, 85 per cent of which was taken in May, June, and July, and 15 per cent in April and August.

In 1892 the total catch of chinook salmon amounted to 22,738,900 pounds, and the fishing season extended from April 10 to August 10, and during September and October; 85 per cent of the total catch was made in the months of May, June, and July; 15 per cent in April and August; none in September or October.

It will be evident from the percentages given above, and by reference to the table, that the most productive fishing operations for the pound-net and gill-net region of the river are during the months of May, June, and July. The number of chinook salmon taken in April and August is relatively small, and under conditions not so profitable, either to the canneries or the fishermen, as those carried on during the months of May, June, and July. The April run of this salmon, if allowed to pass without interruption to the headwaters of the Columbia and its tributaries, would spawn in those waters, and the present productive capacity of the river would be increased to such an extent as to much more than compensate for the restrictions imposed by the prohibition of the fishery operations during the month of April.

The August run of chinook salmon consists of gravid fish near their spawning time. The flesh for this reason has undergone deterioration, and if canned constitutes an inferior product, the sale of which will discredit the reputation which the Columbia River salmon justly hold in public estimation. None of the August run of chinooks probably ascends the Columbia above the Dalles. They spawn in the tributary streams of the Lower Columbia and in the main stream between the Dalles and the mouth of the river.

RECOMMENDATIONS.

Having in view the considerations above presented, there can be no doubt of the necessity of restrictive regulations to maintain the salmon fisheries of the Columbia River. The enactment and enforcement of such regulations as may be necessary to this end is the prerogative of the States occupying the Columbia River basin. There is no precedent for the exercise by the General Government of control over the fisheries of our interior waters, except in so far as the forms of apparatus in use might be regarded as obstructions or impediments to navigation.

Whether the power to regulate the fisheries of interstate and bounding territorial waters is vested in the General Government or in the States is a subject which has provoked, and will continue to provoke, controversy until the respective rights and powers of individual States and the General Government are duly ascertained and defined by the courts of last resort. Having reference, however, to the interests of the fisheries, there is no doubt that these interests would be best subserved by uniform and concurrent regulations covering the entire region in which any special fishery is prosecuted.

In the case of the Columbia, we find that the great market fisheries for the salmon are prosecuted in the lower river, and the immediate evident advantage is to those who are engaged in the capture of the salmon or in canning them for the market. On the other hand, the nurseries for the young salmon, upon the abundance of which depend the productiveness and profit of the fisheries in the lower river, are in the remote tributaries and sources of the river in Washington, Oregon, and Idaho.

Regulations and restrictions of the net fisheries, so as to permit a reasonable number of salmon to reach their spawning-ground in the upper rivers, and protection of the salmon in these waters during their spawning season, in September and October, present the conditions to be fulfilled to keep up supply, so far as this can be accomplished by legal restraints.

To effectively restrain or regulate the net fisheries requires the concurrent action of the States of Washington and Oregon. Effective protection to the salmon on their spawning-grounds can be established only by concurrent action on the part of Washington, Oregon, and Idaho establishing a close season during the months of September and October. Here a serious difficulty arises. On the one hand it will be urged by the net fishermen of Washington and Oregon that any restraint on their operations will be burdensome to them without any corresponding advantage, since the fish they permit to escape their nets will be taken in the head waters to which they go before they have had an opportunity to spawn, and so they will be subject to serious losses and inconvenience without any compensating advantage. On the other hand, the citizens of eastern Washington and Oregon and of remote Idaho will be reluctant to impose any restraints on their own people in reference to the taking of salmon, for the reason that any increase in the fishery arising thereby will inure solely to the benefit of the fishermen between the Dalles and the mouth of the river.

The necessity of concurrent action on the part of the States occupying the Columbia River Basin, and of their cordial coöperation in measures necessary to maintain the salmon fishery of the Columbia River and to improve it, is evident from a consideration of the facts presented. The investigations of the U. S. Fish Commission in the Columbia River Basin made under the instructions of Congress clearly indicate that there is a serious deterioration in the product and value of the salmon fisheries of this river; that this deterioration is to be attributed in large part, if not entirely, to the exclusion of the salmon from their spawning-grounds by the operations of the net fishermen, and that artificial propagation on an adequate scale to compensate for the waste of the fisheries is no longer possible under existing conditions of the fisheries.

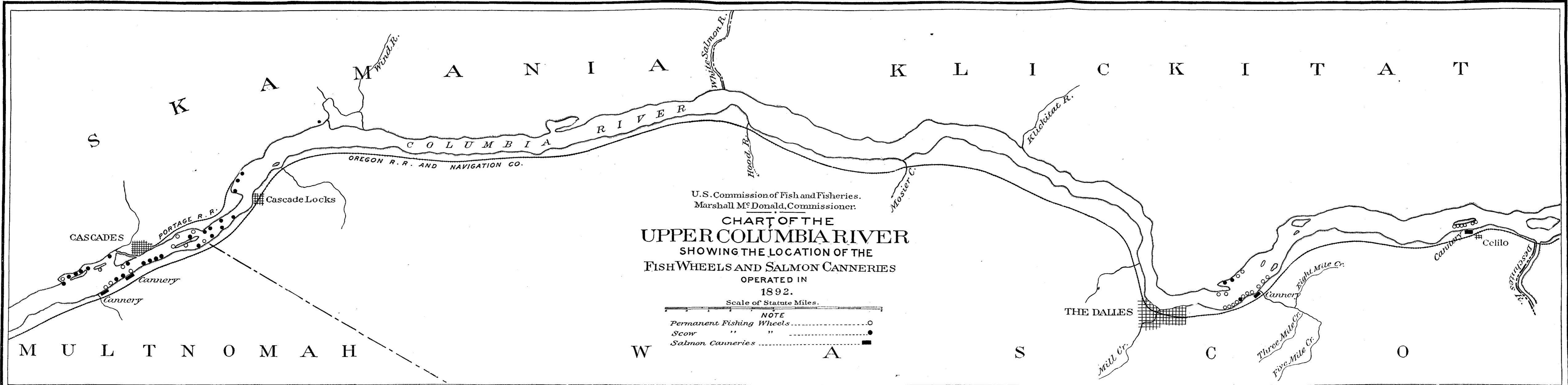
The initial step in attempting the restoration of the salmon fishery is to restrict and regulate the net fishing. The restriction that may be put in force with the least hardship to the fishermen is the shortening of the season of net fishing.

The use of pounds, gill nets, traps, and seines in the lower river, from the Cascades to the mouth, should be limited strictly to the months of May, June, and July. The wheels should not be permitted to take salmon prior to the middle of May, so as to permit the salmon which have entered the river in April the opportunity to pass up to the head waters. A further closed season for wheels should be established from the 1st of August to the 10th of September, so as to provide for the uninterrupted spawning of the August run of salmon. There does not at present appear sufficient reason to prohibit the wheel fishing during the balance of September and during the month of October. Protection for the salmon which have thus been enabled to reach their spawning-grounds should be afforded by a close season during the months of September and October, covering the streams in Washington, Oregon, and Idaho to which the salmon resort for breeding.

Should the policy above outlined be adopted by these States and the requisite measures to carry it into effect be enacted and enforced, it will be possible for the U. S. Fish Commission and the State commissions to greatly enlarge their fish-cultural operations, and to prosecute them under much more satisfactory and economical conditions than at the present time. Until the States interested adopt measures to restrain net fishing, so as to permit a portion at least of the salmon entering the river to pass up to their spawning-grounds, it is not deemed wise or expedient to attempt to increase or extend the work of artificial propagation of the salmon.

All efforts will be disappointing, unprofitable, and nugatory so long as the fisheries continue under existing conditions, and I would recommend, therefore, that no further steps be taken at present looking to the establishment of additional salmon-breeding stations in the Columbia River Basin.

MARSHALL McDONALD,
U. S. Commissioner of Fish and Fisheries.



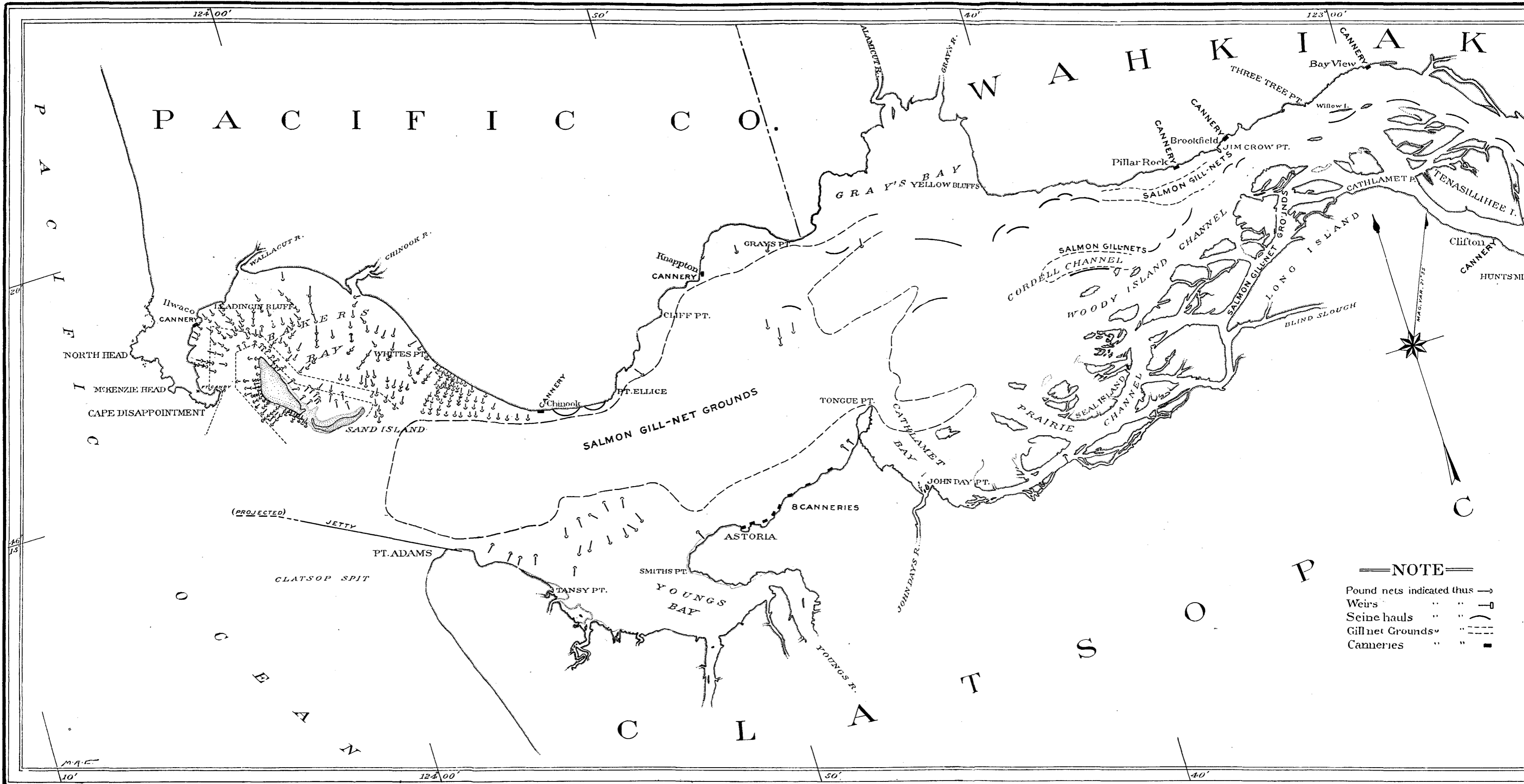
U. S. Commission of Fish and Fisheries.
 Marshall M. Donald, Commissioner.

**CHART OF THE
 UPPER COLUMBIA RIVER**
 SHOWING THE LOCATION OF THE
 FISH WHEELS AND SALMON CANNERIES
 OPERATED IN
 1892.

Scale of Statute Miles.

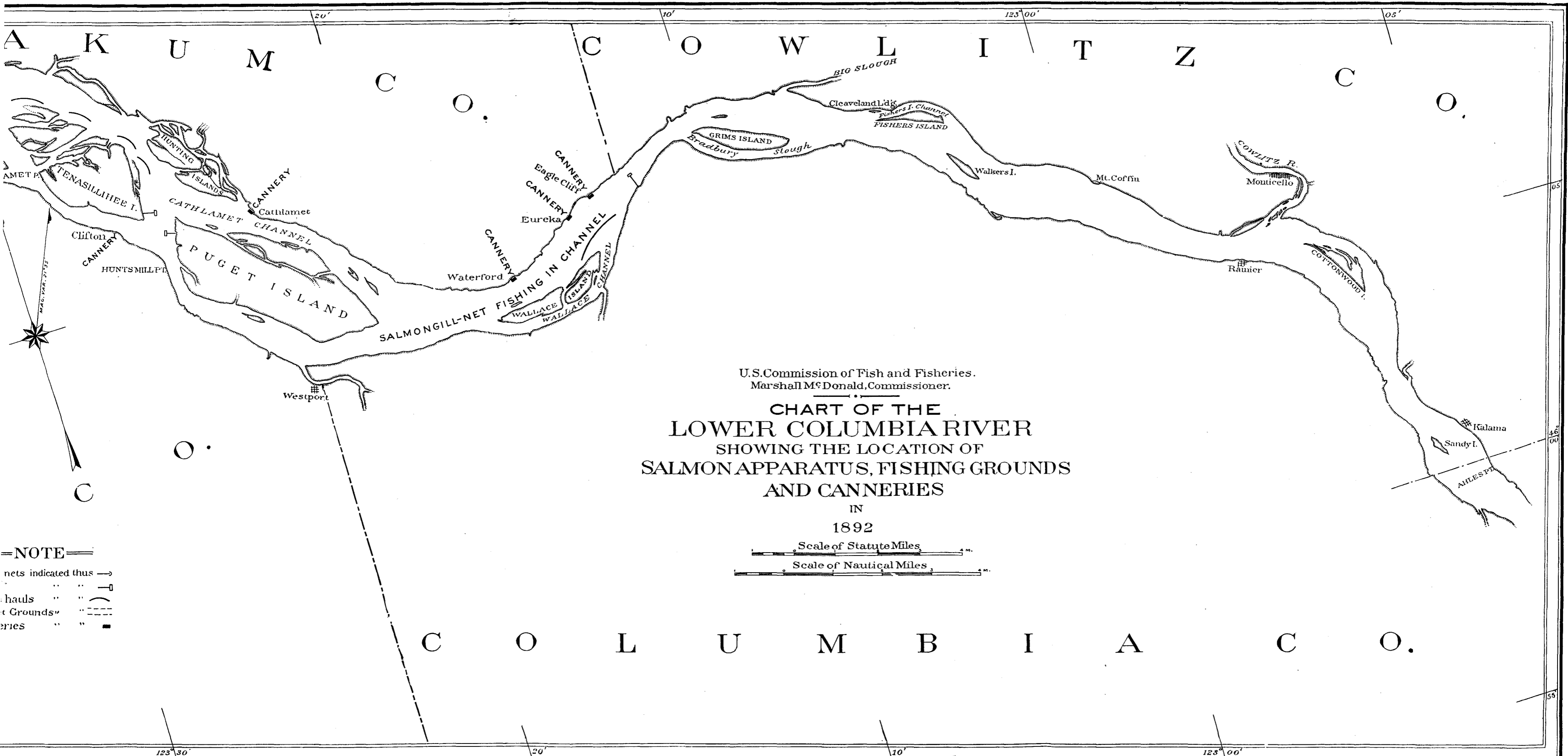
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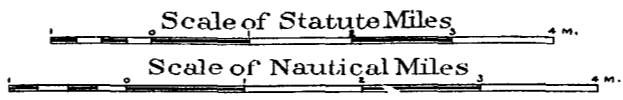
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U.S. Commission of Fish and Fisheries.
 Marshall M^cDonald, Commissioner.

**CHART OF THE
 LOWER COLUMBIA RIVER**
 SHOWING THE LOCATION OF
 SALMON APPARATUS, FISHING GROUNDS
 AND CANNERIES

IN
 1892



NOTE

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