XXV.—REPORT OF OPERATIONS AT THE UNITED STATES SALMON-BREEDING STATION ON THE McCLOUD RIVER, CALIFORNIA, DURING THE SEASON OF 1879.

By LIVINGSTON STONE.

Hon. SPENCER F. BAIRD,

SIR: I beg leave to report as follows: The general features of the season's operations in taking salmon eggs were the same as reported in previous years with the one exception, that two racks were placed across the McCloud River this season instead of one, as heretofore. The upper rack is intended to obstruct the course of the salmon up the river, and to detain them at the fishery, where they can be caught for the purpose of securing their eggs. This plan of detaining the spawning fish at a favorable point for capture, by placing an impassable barrier in the river, was first adopted in 1874, and has proved itself a great success. The annual yield of salmon eggs increased the first year it was tried from two million to five million and a half, and was secured with far less labor than ever before. From that time to this, also, it has enabled the United States Fish Commission to obtain all the eggs it required to supply both this country and foreign countries, the quantity culminating last year in a total number of fourteen millions.*

This obstructing the salmon by an impassable rack really amounts to the same as confining them in pens, except that it is on a larger scale. As the rack prevents them from going up the river, and their irrepressible instinct to ascend the river keeps them from going down, they become confined on a large scale under the most favorable conditions possible. Their native river is their prison. All their surroundings are favorable, natural, and healthful. They have the whole volume of the river for their water supply, and in every way it is the most desirable form of confinement possible; nothing better could be wished. The great advantage of this method of confinement showed itself as soon as it was tried in the vastly-improved condition of the salmon. While before hundreds of the spawning salmon died in the artificial

* NOTE.—The total number reported in 1878 was twelve millions, this being the number, according to measure; but, the eggs that year being smaller than usual, the actual number, according to count, must have exceeded fourteen millions.

ponds and corrals in which they were placed, now none whatever die, or appear even to suffer, from the effects of their confinement.

Some people have ridiculously supposed that placing an obstruction across the river would do mischief, by setting an example to lawless persons, who would be tempted to do the same elsewhere. The utter folly of such a supposition is at once apparent to any one who knows anything about the matter, and I consequently do not need to say anything further on the subject.

Besides this upper rack to detain the salmon, a second rack, reaching nearly but not quite to the bottom, was put across the river just below the fishing-ground. The object of this second rack was to prevent the salmon from falling below the fishing-ground during the fishing season, for, although the instinct of the salmon is so strong to ascend the river, they will, nevertheless, when they find they cannot pass the upper rack and are being constantly harassed by the drawing of the seine, fall back down the river far enough to get out of reach of the net. Here they will remain, unless driven off, and deposit their spawn. From this source of trouble our fishing operations have suffered every year, and this year I thought I would try the experiment of putting the additional rack, just mentioned below the seining-ground, to see if it would not prevent the fish in some degree from dropping down the river out of reach of the net. The rack, not reaching the bed of the stream by eight or ten inches, is no obstruction to the ascending salmon, as they swim very low, but does obstruct the salmon above the dam from going down the river, as they swim higher and do not hunt so diligently for a passage for escape in that direction. The practical workings of this second rack did not, however, meet our expectations, and I would not recommend its use again.

The work of building the first bridge and rack began in May, and on the 10th of July the river was entirely closed to the salmon. The second bridge was then built, but the rack connected with it was not lowered into the river until the 1st of September. The upper rack was no sooner completed than the salmon began to accumulate as usual in great numbers below it. There were large patches where the river was black with them. Thousands could be seen from the high banks on either side of the river. They assaulted the rack by hundreds, and so many could be seen jumping at once that they could not be accurately counted. They seemed to be so innumerable that high hopes were cherished of an unusually successful season, but when we came to make a trial haul of the net we found how illusive the most flattering hopes may prove to be. All this immense accumulation of fish in the river turned out, with very few exceptions, to be young male salmon, or, as they are commonly called, grilse. This discovery occasioned no little dismay and alarm.

Day after day we hauled the net, from the middle of July to the middle of August, but with the same result. There appeared to be nothing

but small grilse in the river. We caught them by thousands—young male salmon weighing from two to six pounds—while the female salmon were so scarce that they did not average more than one to every fifty fish caught. We tried to get rid of the grilse. We gave hundreds to the Indians. We let thousands go up the river through the bridge, but still they did not materially diminish, nor did the number of females increase. The river seemed to be full of grilse and nothing else. I think the most plausible explanation of this excessive disproportion of the two sexes in the river is as follows: The canneries on the main Sacramento were running at their fullest capacity all summer, having a vast number of drift-nets in the river nearly all the time. It is quite possible that some of them fished with small-meshed nets. This would account for the fact that no large fish reached the McCloud. The great increase of salmon in the Sacramento, occasioned by artificial hatching, accounts for the other part of the mystery, viz, the immense number of grilse.

The law prohibiting the capture of salmon in nets comes into force on the 1st day of August. Consequently, the course of the salmon up the Sacramento was unobstructed by nets after that day, and about two weeks later large salmon began to appear in the McCloud, and from that time they continued to increase, so that by the 1st of September we occasionally caught as many large salmon as small ones, and of the large ones one-half or more were frequently females.

As the season progressed another peculiarity developed itself. After a few days of taking eggs, the spawning season, contrary to all our previous experience, seemed to remain at a standstill; in other words, the number and proportion of ripe spawners did not increase with the progress of the season as usual. For instance, on the 6th of September, when the McCloud salmon had nearly finished spawning in 1876, the ratio of unripe females to the ripe ones was greater than it was a week before, and, judging from the unadvanced condition of the females on that day, one would have said that the spawning season had just commenced, instead of having been in progress nearly a fortnight. No explanation of this peculiarity has yet presented itself.

By the 20th of August the corrals for holding the spawning salmon were put in the river, the spawning-house was built, all the trays and covers and troughs of both hatching-houses were put in order, and everything placed in readiness for taking eggs.

It had been my expectation to take a very large number of salmon eggs this year. Indeed, I hoped to eclipse all previous years, and was going on with that expectation till I received your telegram stating that not over six million eggs would be required. On receiving this dispatch I reduced my force to the lowest number possible to carry on operations, and with this number I continued work until the eggs were all taken and shipped.

We took the first salmon eggs on the 25th of August, and on the 8th

of September the quota for California was filled. I set aside for the State this year 2,300,000 eggs. The State receives this allotment in the form of eggs and hatches the eggs at the State's expense, placing the newly-hatched salmon in the tributaries of the main Sacramento to keep up the stock of that river.

It may not be out of place to add here that since the artificial hatching has been carried on at this place the salmon in the Sacramento have immensely increased; so much so that, although the canneries have increased and the sea-lions and the fishermen also, the salmon have, nevertheless, made a steady gain in numbers; or, to use the words of Hon. B. B. Redding, the secretary of the California fish commission, "the commission has, with the aid of the artificial hatching of salmon, beaten the sea-lions, the canneries, and the fishermen combined."

After all the eggs are taken for the State, the next thing is to take eggs for the ice-car which conveys the eastern consignments from Redding, Cal., to Chicago, Ill. In order to fill this car and not to be obliged to use eggs that are too far advanced nor those which are not sufficiently advanced, it is necessary to take them within a limited number of days, otherwise one of the two evils just mentioned must be encountered, and either one would be fatal to the successful transportation of the eggs across the continent. In order to facilitate this, we rested from taking eggs on the 9th of September, and on the 10th we began taking for the car-load. On the night of the 17th of September we had six million eggs in the large hatching-house. The eggs in the large hatching-house mature in about nineteen days. Besides the main hatching-house there is a smaller one, where the water supply is so much warmer that the eggs mature in eleven days, or a week earlier than in the other house. On the 18th of September, therefore, we stopped taking eggs again, and recommenced taking from the supplementary hatching-house on the 21st and continued till the night of the 24th. These eggs, maturing about the same time as the main lot, furnished sufficient of the right age for shipment in the ice-car, and gave us a total in round numbers of seven million eggs.

MATURING AND PACKING THE EGGS.

Nothing new was introduced this year into the usual method of hatching the eggs, though somewhat more care was exercised in taking the eggs, which resulted in a better impregnation and a consequently smaller loss in bringing the eggs forward for shipment.

The packing of the eggs was also conducted as usual. Last year and the year before some apprehension was felt lest the supply of packing moss, which is only found in one locality, near Mount Shasta, might in time be exhausted. Our apprehensions were entirely put at rest this year by finding that a new growth had come on where we first gathered the moss seven years ago, which shows that it is growing as fast as it

is being gathered, and consequently will be inexhaustible if the supply is not drawn on any faster in the future than it has been during the eight seasons that we have used it. The ice-car was employed as usual to convey the eggs from Redding to Chicago. The entire space not taken up by the crates of eggs was filled full of ice and all the eggs, with possibly the exception of one crate, arrived at Chicago in first rate condition. From here the more northern consignments were distributed by the express companies, while the southern eggs were shipped into a regular refrigerator car and forwarded to Washington, whence they were sent by express to their destinations.

YOUNG SALMON FOR THE SACRAMENTO.

Two and one-half millions of eggs for California were left at the fishery, where they were hatched out at the expense of the California Fish Commission and the young fish placed in the tributaries of the Sacramento.

THE INDIANS.

It will be remembered, perhaps, that last year a good deal of uneasiness was caused at the fishery and in the neighboring settlements by the threatened attitude of some of the Indians to the north and east of the McCloud River. Nothing was apprehended from the Indians in the immediate vicinity of the fishery; but there were others at no great distance from us who were inciting their companions to make an outbreak, and we heard of frequent threats of mischief being made by the northern and eastern Indians, and by some restless spirits nearer home; and although the actual danger of an attack might have been very slight, it was perfectly apparent that the hostility to the whites, which then extended from the Sierra Nevada range to the Missouri River, had reached the McCloud, and that many Indians not far from us had caught the infection. All this was entirely changed this year. It could be seen in the faces of the Indians. The universal uprising of all the Indians between the Sierras and the Missouri, which had been so long contemplated, and which was to have culminated in July, 1878, having been checked by the vigilance of the War Department, the project seems to have been given up for the present, and the effect of it was felt even at this distance. The Indians who advocated an uprising last year were silent on the subject this year, and the air of insolence among the more lawless ones last season had entirely disappeared this season. Indeed, the Indians were never better behaved or more manageable than they were this year; and it is only justice to them to say that much of the success of our work here is due to their assistance. A large number (between twenty and thirty) of them are employed at the fishery every year, and they are very efficient and valuable assistants, particularly in

handling the fish, drawing the seine, picking over the eggs, and similar work. If we could not have the Indians to help us, it would be very difficult to supply their place.

THE PRESENCE OF SOLDIERS AT THE FISHERY.

We pass naturally from the Indians to the soldiers, although this year the soldiers were not needed to protect us from the Indians. They were, however, needed, and, indeed, a military guard is needed here every year on general principles. It is not so much what the soldiers do when they are here that makes them valuable, as it is their presence on the premises.

Their mere presence is a great help, because it prevents trespasses from being committed, and, on the principle that a remedy that prevents disease is worth more than the remedy which cures the disease, it is an excellent thing to have soldiers on the reservation. For instance, it was habitual with the Indians to kill the spawning salmon before the soldiers arrived, and not only this, but a corner post of the reservation was twice torn up this spring by white men and thrown away. An Indian's horse was shot on the reservation, and one settler drew a shotgun on another in a quarrel, which might have terminated fatally. A settler also attempted to build a fence within the reservation, and the timber on the reservation was cut indiscriminately by outsiders before the soldiers came. Nothing of this sort has occurred since the arrival of the military guard, and would never have happened at all had the guard been here at the time these trespasses were committed.

I take this opportunity to acknowledge the courtesy of General McDowell in sending the guard to the Fishery Reservation immediately upon my application for it.

Allow me to say in this connection that the Fishery Reservation ought to be extended at the earliest possible moment. Settlers are beginning to come to the McCloud River. They take up a claim, burn the Indian rancheries, shoot their horses, plow up their graveyards, and drive the Indians back into the hills, the ultimate result of which must be approximate starvation.

Besides this, miners may at any time roil the river above the fishery by their mining operations, and thus ruin almost the last and only spawning-ground of the Sacramento salmon. Fishermen may come in with their nets below the fishery, and by capturing the spawning salmon wholly destroy the usefulness of the United States salmon-hatching station at this place.

These considerations make it highly desirable that the reservation be extended at least far enough up the river to include the trout-breeding station, which has just been established four miles above the salmon fishery.

In closing I beg to recommend that scientific investigations be carried on at the McCloud River in connection with the regular fishery work.

Owing to the long-standing hostility of the Indians in this neighborhood, and for various reasons, very little scientific work has ever been done here, and almost every naturalist who visits this region finds something new to science. This circumstance, added to the fact that it is a very interesting region generally, from a scientific point of view, makes it very desirable that in future scientific investigations be connected with the regular work of the United States Fish Commission at this point.

LIVINGSTON STONE.

Table of temperatures taken at the United States salmon-breeding station, McCloud River, California, during the season of 1879.

Date.	Air.				Water.			Wind.	Lowest night temperature.	Weather.
	Shade.			Sun.						
	7 a. m.	3 p. m.	7 p. m.	3 p. m.	7 a. m.	3 p. m.	7 p. m.			
	°	°	°	°	°	°	°		°	
July 4	59	79	66	93	55	59	56	S.	50	Clear.
5	57	86	70	112	54	58	56	W.	56	Do.
6	62	90	68	122	54	58	57	SE.	46	Do.
7	50	86	67	112	54	58	58	SE.	45	Do.
8	58	84	74	112	54	59	57	S.	45	Do.
9	58	87	68	113	54	59	58	E.	46	Do.
10	59	88	82	112	55	59	59	NE.	52	Rain.
11	60	70	65	.....	56	58	55	S.	51	Clear.
12	60	83	70	110	55	58	58	SE.	53	Do.
13	64	82	65	110	56	60	58	SW.	58	Do.
14	58	87	70	110	56	60	58	E.	50	Do.
15	57	90	75	120	56	60	60	W.	51	Do.
16	64	96	83	132	56	62	61	E.	50	Do.
17	62	98	80	128	56	60	60	SE.	53	Do.
18	62	96	80	112	56	62	61	W.	54	Do.
19	58	89	70	110	56	60	60	S.	53	Do.
20	57	89	72	116	56	60	60	SE.	52	Do.
21	58	90	58	120	58	60	60	S.	50	Do.
22	60	97	58	126	58	61	60	W.	51	Do.
23	58	98	59	128	58	62	60	S.	59	Do.
24	53	101	61	132	58	62	61	W.	51	Do.
25	54	98	65	130	59	62	60	S.	50	Do.
26	60	106	80	140	58	62	60	SE.	50	Do.
27	60	107	83	140	59	62	61	SW.	50	Do.
28	64	98	80	128	60	62	61	SE.	58	Do.
29	60	100	82	130	58	62	61	SW.	54	Do.
30	62	100	83	130	58	62	61	SE.	55	Do.
31	60	102	82	131	58	62	61	NE.	56	Do.
Aug. 1	72	103	80	134	58	62	60	N.	56	Do.
2	74	103	75	130	56	62	60	N.	52	Do.
3	56	99	77	120	56	62	61	NE.	53	Do.
4	50	97	77	119	56	62	61	SE.	52	Do.
5	48	97	74	128	55	61	61	SE.	53	Do.
6	54	100	74	128	56	60	60	E.	46	Do.
7	58	100	82	130	56	60	61	SE.	51	Do.
8	58	102	86	130	56	60	61	SE.	54	Do.
9	65	103	72	132	56	60	61	S.	55	Do.
10	60	103	74	130	56	60	61	E.	57	Do.
11	57	100	74	128	56	62	61	S.	55	Smoky.
12	56	102	74	128	56	62	61	S.	55	Clear.
13	52	102	73	124	55	60	61	S.	49	Do.
14	52	102	72	124	55	60	61	W.	48	Do.
15	64	103	80	134	56	59	59	NE.	47	Do.
16	62	94	74	120	56	59	59	W.	50	Do.
17	62	97	73	124	56	59	59	W.	59	Do.
18	59	94	74	120	56	59	59	W.	55	Do.
19	58	89	74	118	56	59	58	SW.	55	Do.
20	54	88	73	114	56	59	58	SW.	50	Do.
21	56	62	74	.....	56	59	59	S.	50	Rain.

Table of temperatures taken at the United States salmon-breeding station, &c.—Continued.

Date.	Air. Shade. 7 a. m.	Air. Shade. 3 p. m.	Air. Shade. 7 p. m.	Air. Sun. 3 p. m.	Water. 7 a. m.	Water. 3 p. m.	Water. 7 p. m.	Wind.	Lowest night temperature.	Weather.
	°	°	°	°	°	°	°		°	
Aug. 22	58	80	67	112	56	59	56	.....	56	Clear.
23	58	89	65	112	54	58	57	SE.	50	Do.
24	68	96	70	126	54	58	57	SW.	52	Do.
25	50	94	74	112	54	58	57	S.	47	Do.
26	49	82	76	100	54	58	56	S.	48	Do.
27	60	64	65	.....	54	58	56	S.	55	Cloudy and rain.
28	48	76	62	98	54	58	55	N.	44	Clear.
29	50	80	64	98	54	57	55	N.	45	Do.
30	54	96	70	124	54	58	56	N.	50	Do.
31	50	96	68	118	53	58	56	W.	46	Do.
Sept. 1	62	94	62	116	53	58	57	W.	50	Do.
2	60	98	62	110	53	58	57	W.	52	Do.
3	54	103	69	130	53	58	56	W.	48	Do.
4	56	102	66	135	53	57	56	SW.	52	Do.
5	54	96	60	125	53	58	56	S.	54	Do.
6	53	86	64	106	53	58	55	S.	46	Cloudy.
7	52	90	62	102	53	58	55	S.	48	Clear.
8	48	85	66	94	54	58	56	S.	50	Do.
9	50	80	64	94	55	57	55	N.	46	Do.
10	48	84	66	93	54	57	56	N.	44	Do.
11	52	98	68	106	54	57	57	S.	52	Do.
12	56	95	68	104	55	57	56	S.	52	Do.
13	57	97	64	106	54	56	56	W.	53	Do.
14	53	97	68	110	54	57	56	N.	50	Do.
15	50	102	67	122	55	57	56	N.	47	Do.
16	48	102	63	123	55	57	56	E.	46	Do.
17	55	98	66	108	54	56	56	NW.	52	Do.
18	52	100	62	112	55	56	56	W.	48	Do.
19	50	100	60	110	54	57	56	W.	46	Do.
20	56	68	64	98	54	56	55	W.	48	Do.
21	53	90	64	108	54	56	55	S.	48	Do.
22	55	84	62	98	54	56	54	SW.	50	Do.
23	48	85	64	98	53	55	54	S.	43	Do.
24	48	84	66	95	54	55	55	S.	45	Do.
25	48	76	64	88	53	55	53	S.	46	Hazy.
26	57	82	64	92	52	55	54	SE.	48	Clear.
27	48	84	64	93	53	55	53	S.	46	Do.
28	63	76	62	.....	52	55	53	S.	46	Cloudy.
29	56	82	56	93	51	54	53	S.	45	Clear.
30	45	63	50	.....	51	54	53	S.	44	Rain.

Table of temperatures taken at the United States salmon-breeding station, McCloud River, California, during the season of 1879.

Month.	Air. Shade. 7 a. m.	Air. Shade. 3 p. m.	Air. Shade. 7 p. m.	Air. Sun. 3 p. m.	Water. 7 a. m.	Water. 3 p. m.	Water. 7 p. m.	Wind. 7 a. m.	Wind. 3 p. m.	Wind. 7 p. m.	Weather.
	°	°	°	°							
October 1	48	88	.....	102	51	52	.....	.....	.....	.....	Clear.
October 2	44	.....	.....	.....	50	.....	.....	.....	.....	.....	
October 3	43	.....	.....	.....	49	.....	.....	.....	.....	.....	
October 4	42	.....	.....	.....	51	.....	.....	.....	.....	.....	
October 5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
October 6	51	.....	.....	.....	49	.....	.....	.....	.....	.....	Cloudy.
October 7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
October 8	38	74	.....	82	48	51	.....	.....	E.	.....	Clear.
October 9	42	72	.....	80	48	51	.....	.....	E.	.....	Do.
October 10	42	.....	.....	.....	48	.....	52	.....	E.	.....	Do.
October 11	44	48	47	.....	49	48	48	.....	SW.	.....	Cloudy.
October 12	42	52	48	.....	47	49	49	.....	SW.	.....	Rainy and cloudy.
October 13	43	.....	46	.....	48	.....	49	.....	SW.	.....	Cloudy.

Table of temperatures taken at the United States salmon-breeding station, &c.—Continued.

Month.	Air.				Water.			Wind.			Weather.
	Shade.			Sun.							
	7 a. m.	3 p. m.	7 p. m.	3 p. m.	7 a. m.	3 p. m.	7 p. m.	7 a. m.	3 p. m.	7 p. m.	
	°	°	°	°							
October 14	42	56	53	76	49	52	52	.....	E.	.....	Clear.
October 15	50	61	52	72	49	52	52	.....	S.	.....	Cloudy, a. m.; Clear, p. m.
October 16	42	68	53	90	49	51	51	.....	E.	.....	Clear.
October 17	38	71	.....	96	48	52	.....	.....	.....	.....	Do.
October 18	40	70	55	88	48	51	51	.....	.....	.....	Do.
October 19	42	70	50	90	48	52	52	.....	.....	.....	Do.
October 20	46	72	56	90	49	51	51	.....	SW. W.	.....	Cloudy, a. m.; Clear, p. m.
October 21	46	78	57	100	49	51	51	.....	W.	.....	Do.
October 22	.....	65	52	96	.....	51	51	.....	W.	.....	Do.
October 23	.....	.....	52	.....	.....	.....	50	.....	W.	.....	Do.
October 24	.....	.....	56	.....	.....	.....	.....	.....	.....	.....	Do.
October 25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Do.
October 26	.....	.....	.....	.....	.....	.....	.....	.....	W.	.....	Do.
October 27	46	80	57	120	48	51	51	.....	W.	.....	Do.
October 28	48	75	58	95	48	51	51	.....	W.	.....	Do.
October 29	40	78	54	127	48	50	50	.....	W.	.....	Do.
October 30	38	77	48	112	47	49	49	.....	W.	.....	Do.
October 31	38	65	51	95	46	50	50	.....	W.	.....	Do.
November 1	38	65	65	90	46	50	.....	.....	W.	.....	Clear.
November 2	36	68	52	98	46	49	49	.....	W.	.....	Do.
November 3	35	61	48	.....	46	48	48	.....	.....	.....	Cloudy.
November 4	40	65	54	.....	46	48	48	.....	SW.	.....	Do.
November 5	50	53	51	.....	48	.....	.....	E.	S.	.....	Do.
November 6	45	60	.....	.....	48	49	48	.....	S.	.....	Clear, a. m.; Cloudy, p. m.
November 7	33	53	45	.....	47	48	48	.....	S.	.....	Cloudy.
November 8	41	46	.....	.....	46	46	46	.....	S.	.....	Rain.
November 9	41	46	.....	.....	46	46	46	.....	E.	.....	Do.
November 10	34	.....	47	.....	43	46	46	.....	S.	.....	Clear.
November 11	46	.....	40	.....	46	46	46	.....	S.	.....	Do.
November 12	46	43	42	.....	46	46	46	.....	S.	.....	Rain.
November 13	43	45	46	.....	46	46	46	.....	S.	.....	Do.
November 14	46	53	44	.....	46	46	46	.....	S.	.....	Cloudy.
November 15	42	54	42	62	47	47	47	SE.	NE.	.....	Cloudy, a. m.; Clear, p. m.
November 16	33	60	39	78	45	46	46	.....	NE.	.....	Clear.
November 17	48	72	.....	85	43	45	45	.....	NE.	.....	Do.
November 18	36	72	41	80	43	45	45	NE.	SE.	.....	Do.
November 19	30	.....	43	.....	43	45	45	.....	NE.	.....	Do.
November 20	30	.....	.....	.....	43	.....	.....	.....	NE.	.....	Do.
November 21	28	62	40	87	43	45	45	.....	NE.	.....	Do.
November 22	30	62	42	105	43	45	45	.....	NE.	.....	Do.
November 23	28	56	41	80	43	47	47	.....	NE.	.....	Do.
November 24	30	60	40	92	45	47	47	.....	E.	.....	Do.
November 25	30	57	42	107	45	45	45	.....	NE.	.....	Do.
November 26	34	56	41	85	42	45	45	.....	NE.	.....	Do.
November 27	28	51	42	85	42	43	43	.....	SE.	.....	Do.
November 28	29	50	43	.....	43	43	43	.....	NE.	.....	Cloudy.
November 29	29	50	40	.....	44	44	48	.....	NE.	.....	Rain.
November 30	40	44	44	.....	45	45	45	.....	.....	.....	Do.

Table of distribution of salmon eggs from the United States salmon-breeding station, McCloud River, California, during the season of 1879.

State.	Commissioner.	Number asked.	Number assigned.	Number forwarded.	Destination.
Iowa	B. F. Shaw	50,000	50,000	50,000	B. F. Shaw, Anamosa, Iowa.
Kansas	D. B. Long	100,000	100,000	100,000	D. B. Long, Ellsworth, Kans.
Maryland		500,000	500,000	500,000	T. B. Ferguson, Baltimore, Md.
Minnesota	R. O. Sweeny	400,000	400,000	400,000	R. O. Sweeny, Saint Paul, Minn.
Nebraska	W. L. May	50,000	50,000	50,000	W. L. May, Frémont, Nebr.
Do		50,000	50,000	50,000	H. S. Kaley, Red Cloud, Nebr.
Do		100,000	100,000	100,000	J. G. Romaine, South Bend, Nebr.
New Jersey	E. J. Anderson	500,000	500,000	500,000	Mrs. J. H. Slack, Bloomsbury, N. J.
North Carolina	L. L. Polk	350,000	350,000	350,000	S. G. Worth, Morgantown, N. C.
Ohio	E. D. Potter	200,000	200,000	200,000	E. D. Potter, Toledo, Ohio.
Pennsylvania	James Duffy	200,000	200,000	200,000	James Duffy, Marietta, Pa.
Do	do	100,000	100,000	100,000	Seth Weeks, Corry, Erie County, Pa.
Utah	A. P. Rockwood	100,000	100,000	100,000	A. P. Rockwood, Salt Lake City, Utah.
Virginia	M. McDonald	300,000	300,000	300,000	M. McDonald, Lexington, Va.
Do		200,000	200,000	200,000	W. F. Page, Wytheville, Va.
West Virginia	H. B. Miller	150,000	150,000	150,000	C. S. White, Romney, W. Va.
Wisconsin	N. K. Fairbank	300,000	300,000	300,000	N. K. Fairbanks, Geneva Lake, Wis.
Netherlands		100,000	100,000	100,000	Zoological Society, Amsterdam.
New South Wales		50,000	50,000	50,000	J. Stuart, Morrickville, Sydney, N. S. W.
France		100,000	100,000	100,000	Acclimatation Society, Paris.
Germany		100,000	100,000	100,000	Deutsche Fischerei Verein.
Canada		100,000	100,000	100,000	S. Wilmot, Newcastle, Ontario.
New York	E. G. Blackford	50,000	50,000	50,000	E. G. Blackford, New York, N. Y.

Table of salmon eggs taken at the United States salmon-breeding station, McCloud River, California, during the season of 1879.

Date.	Number of eggs taken.	Total number of eggs taken.	Number of salmon spawned.	Total number of salmon spawned.
Aug. 24	3,850		2	
27	9,900	13,750	3	5
29	61,050	74,800	15	20
30	90,750	165,550	19	39
Sept. 1	155,100	320,650	38	77
2	261,800	582,450	60	137
3	270,600	853,050	61	198
4	367,400	1,220,450	75	273
5	382,800	1,603,250	92	365
6	260,700	1,863,950	60	425
7	318,450	2,182,400	71	496
8	409,200	2,591,600	92	588
10	882,200	3,473,800	223	811
11	239,250	3,713,050	56	867
12	519,750	4,232,800	95	962
13	313,500	4,546,300	87	1,049
14	242,550	4,788,850	56	1,105
15	429,000	5,217,850	75	1,180
16	462,000	5,679,850	115	1,295
17	363,000	6,042,850	100	1,395
21	462,000	6,504,850	115	1,510
22	198,000	6,702,850	57	1,567
23	104,500	6,806,850	27	1,594
24	82,500	6,889,350	26	1,620

Table of weights of female salmon after spawning, McCloud River, California, 1879.

	Total number of fish.	Total weight.	Average weight.
August 30.—Weight (pounds), 14, 13, 14, 12, 15, 10, 10, 10, 15, 9, 9, 13, 10, 12, 8, 15, 9, 8, 7..	19	213	11.21
September 1.—Weight (pounds), 13, 16, 8, 15, 17, 9, 9, 9, 6, 8, 8, 12, 10, 10, 11, 16, 8, 12, 8, 16, 10, 11, 14, 8, 8, 16, 12, 7, 10, 13, 10, 10, 8, 10, 9, 8, 10, 10	38	405	10.65
September 2.—Weight (pounds), 12, 11, 9, 11, 9, 9, 8, 12, 12, 7, 8, 11, 11, 11, 11, 8, 13, 14, 9, 6, 8, 15, 14, 9, 8, 14, 7, 9, 14, 10, 8, 9, 12, 11, 13, 11, 9, 14, 10, 14, 15, 8, 12, 17, 12, 11, 5, 12, 13, 10, 10, 11, 15, 12, 15, 13, 12, 8, 16, 7	60	655	10.9
September 3.—Weight (pounds), 13, 7, 15, 10, 13, 10, 12, 12, 11, 11, 10, 15, 11, 10, 8, 12, 13, 15, 16, 16, 12, 15, 8, 17, 10, 14, 9, 10, 14, 17, 14, 17, 6, 16, 9, 13, 14, 8, 10, 17, 11, 13, 8, 13, 11, 11, 7, 12, 10, 16, 14, 10, 16, 14, 8, 9, 8, 10, 8, 15. 14, 11, 10, 9, 16, 15, 18, 14, 13, 10, 12, 8, 13, 10, 7	75	896	11.99
September 4.—Weight (pounds), 15, 7, 14, 10, 11, 11, 12, 12, 11, 7, 12, 11, 8, 11, 13, 14, 13, 15, 10, 8, 7, 6, 15, 9, 8, 16, 6, 8, 12, 14, 12, 17, 8, 14, 12, 12, 15, 14, 13, 9, 12, 10, 12, 13, 10, 14, 13, 14, 10, 16, 8, 14, 8, 11, 8, 8, 8, 7, 8, 8, 8	60	668	10.95
September 5.—Weight (pounds), 16, 9, 16, 12, 16, 16, 16, 16, 12, 13, 7, 10, 12, 6, 8, 7, 15, 11, 15, 12, 9, 12, 11. 10, 7, 21, 10. 14, 15, 9, 14, 12, 13, 10, 17, 8, 8, 9, 12, 11, 14, 9, 11, 6, 11, 11, 12, 8, 12, 13, 10, 11, 6, 9, 7, 13, 9, 9, 9, 7, 7, 7, 9, 8, 14, 8, 15, 10, 8, 8, 8, 13, 10, 13, 10, 8, 8, 11, 12, 8, 7, 8, 7, 8, 17, 11, 13, 9, 15, 12, 11, 8	92	991	10.87
September 6.—Weight (pounds), 9, 10, 13, 9, 16, 14, 6, 12, 12, 5, 12, 18, 12, 14, 7, 11, 14, 9, 10, 8, 14, 12, 8, 11, 11, 13, 9, 13, 12, 12, 18, 15, 15, 12, 8, 12, 11, 15, 8, 12, 10, 11, 8, 9, 11, 14, 8, 7, 13, 9, 9, 9, 9, 9, 10, 9, 12, 8, 8	60	662	11.03
September 7.—Weight (pounds), 12, 17, 13, 11, 10, 14, 7, 11, 15, 8, 15, 7, 8, 12, 12, 16, 8, 12, 14, 11, 10, 14, 13, 14, 11, 14, 10, 8, 10, 10, 13, 10, 16, 14, 18, 10, 11, 13, 9, 12, 10, 11, 8, 6, 12, 9, 15, 9, 12, 10, 10, 9, 12, 7, 11, 8, 9, 9, 8, 8, 8, 9, 14, 9, 17, 10, 12, 11, 8, 12, 12	71	796	11.21
September 8.—Weight (pounds), 12, 9, 10, 13, 10, 8, 15, 10, 12, 9, 8, 16, 10, 16, 9, 14, 14, 10, 12, 11, 11, 17, 10, 6, 8, 7, 10, 13, 8, 10, 17, 15, 14, 14, 9, 8, 8, 8, 5, 14, 8, 14, 10, 12, 13, 16, 12, 15, 13, 11, 12, 8, 16, 14, 13, 8, 10, 13, 10, 11, 11, 14, 14, 10, 8, 8, 10, 11, 16, 15, 11, 12, 15, 7, 7, 7, 8, 6, 9, 14, 8, 9, 16, 10, 8, 8, 12, 8, 14, 9, 14	92	1,020	11.08

Record of seining operations conducted at United States fishery, Baird, Cal., on the McCloud River, from July 22 to September 22, 1879, on account of United States, by Livingston Stone.

Date.	Hour.	Temperature of air.	Condition of—		Fish taken.		Ripe fish, females.
			Sky.	Water.	Males.	Females.	
		°					
July 22	7.30 p. m	70	Clear	Clear	300	2	.....
24	7.35 p. m	70	...do	...do	500	8	.....
26	7.30 p. m	72	...do	...do	450	25	.....
30	7.40 p. m	75	...do	...do	1,000	6	.....
Aug. 1	7.00 p. m	80	...do	...do	400	5	.....
4	7.30 p. m	75	...do	...do	700	11	.....
7	7.15 p. m	82	...do	...do	220	7	.....
8	7.30 p. m	74	.....	...do	100	7	.....
11	7.45 p. m	70	.....	.....	500	32	.....
12	1.15 p. m	100	Clear	Clear	200	7	.....
12	7.45 p. m	71	...do	...do	1,000	20	.....
16	7.00 p. m	74	...do	...do	200	5	.....
17	7.00 a. m	62	...do	...do	100	.....	.....
17	7.30 p. m	73	...do	...do	250	61	.....
19	7.00 p. m	74	...do	.....	300	61	.....
22	7.00 p. m	67	.....	.....	250	26	1
24	7.15 p. m	.....	.....	.....	200	60	4

Record of seining operations conducted at Baird, Cal., on the McCloud River, from August 25 to September 4, 1879, on account of United States, by Livingston Stone et al.

Date.	Hour.	Temperature of air.	Fish taken.		Ripe fish, females.
			Males.	Females.	
		°			
Aug. 25	7.00 p. m	67	180	65	4
27	7.15 p. m	65	130	23	7
28	7.00 p. m	.....	150	150	12
29	7.15 a. m	.....	95	100	10
31	7.00 p. m	68	100	29	7
31	7.10 p. m	67	200	59	9
31	7.45 p. m	64	260	44	4
31	7.50 p. m	64	300	49	9
31	9.30 p. m	62	200	56	6
31	9.40 p. m	62	300	55	5
31	12.00 p. m	57	100	23	3
Sept. 1	7.30 a. m	60	100	30	6
1	7.45 a. m	65	30	5	1
1	8.10 a. m	67	55	25	7
1	7.15 p. m	62	70	32	2
1	7.30 p. m	62	40	20	1
1	8.20 p. m	56	56	15	.....
1	9.00 p. m	56	200	50	3
1	9.45 p. m	52	50	20	6
1	10.20 p. m	51	80	15	6
1	10.55 p. m	50	150	45	4
1	11.50 p. m	50	145	35	9
2	7.10 a. m	57	400	175	3
2	7.30 a. m	60	125	30	20
2	8.40 a. m	80	100	57	6
2	7.00 p. m	64	480	150	7
2	7.15 p. m	64	150	20	27
2	8.45 p. m	58	100	20	2
2	9.45 p. m	57	85	15	9
2	10.45 p. m	56	80	20	5
2	11.30 p. m	54	90	15	4
3	7.30 p. m	68	200	40	4
3	7.50 p. m	66	160	40	12
3	8.10 p. m	64	180	20	6
3	9.00 p. m	56	270	20	5
3	9.45 p. m	55	240	35	6
3	10.40 p. m	53	170	30	14
3	11.35 p. m	52	130	28	11
3	12.15 p. m	52	240	35	9
3	7.10 a. m	54	400	100	9
3	7.30 a. m	64	125	75	20
3	9.05 a. m	80	80	10	5
4	7.10 a. m	56	100	10	.....
4	8.30 a. m	64	60	40	1
4	9.05 a. m	75	275	100	5
4	10.40 a. m	82	225	50	6
					4

Record of seining operations conducted at Baird, Cal., on the McCloud River, from September 4 to September 21, 1879, on account of United States, by Livingston Stone.

Date.	Hour.	Temperature of air.	Fish taken.		Ripe fish, females.
			Males.	Females.	
		°			
Sept. 4	7.30 p. m	66	300	30	12
4	7.45 p. m	64	100	46	6
4	8.15 p. m	58	300	103	12
4	9.00 p. m	56	200	75	6
4	9.30 p. m	55	100	50	3
4	10.00 p. m	54	500	150	7
4	11.00 p. m	54	300	125	5
4	12.00 p. m	54	300	150	7
5	7.40 a. m	57	300	90	13
5	7.50 a. m	60	200	50	4
5	1.40 p. m	90	175	75	13
5	7.15 p. m	66	175	30	11
5	7.45 p. m	62	125	13	.....
5	8.30 p. m	62	125	14	4
5	9.15 p. m	58	125	14	3
5	10.10 p. m	58	250	50	5
5	11.00 p. m	56	200	35	5
5	11.30 p. m	56	250	30	6
5	12.10 p. m	56	200	35	5
6	7.30 a. m	58	200	50	7
6	7.45 a. m	60	350	100	8
6	8.40 a. m	68	125	35	4
6	1.35 p. m	90	150	20	8
6	7.15 p. m	60	200	50	7
6	7.30 p. m	58	200	50	10
6	8.30 p. m	57	300	40	6
6	9.30 p. m	56	200	50	7
6	9.45 p. m	56	300	25	6
6	10.30 p. m	56	200	25	6
6	11.30 p. m	55	500	80	13
6	12.15 p. m	55	200	40	5
7	7.10 a. m	54	150	50	37
7	1.20 p. m	91	150	50	15
7	1.40 p. m	91	100	40	4
7	7.15 p. m	64	400	100	13
7	7.30 p. m	62	200	25	8
7	8.10 p. m	60	200	25	4
7	9.00 p. m	60	150	10	2
7	9.30 p. m	58	250	25	4
7	10.40 p. m	58	200	20	4
7	11.30 p. m	56	200	20	8
7	12.10 p. m	54	150	18	4
8	7.05 a. m	58	150	50	9
8	7.20 a. m	62	175	40	7
8	1.40 p. m	95	200	50	9
8	7.15 p. m	65	200	23	9
8	8.05 p. m	64	300	15	8
8	9.00 p. m	62	200	20	10
8	9.45 p. m	60	150	25	6
8	10.15 p. m	59	200	20	6
8	11.10 p. m	58	150	25	4
8	12.00 p. m	58	100	15	5
9	7.10 a. m	54	400	125	21
9	9.30 a. m	67	300	75	15
9	9.45 a. m	70	225	50	8
9	2.00 p. m	80	100	20	4
9	2.15 p. m	90	300	50	11
9	7.30 p. m	65	400	50	6
9	8.00 p. m	65	300	30	7
9	9.00 p. m	61	125	20	5
9	10.00 p. m	60	150	20	9
9	10.45 p. m	60	25	3	2
9	11.50 p. m	60	75	15	5
10	7.20 a. m	52	100	40	8
10	9.30 a. m	70	125	50	10
10	1.35 p. m	89	200	125	11
10	7.50 p. m	60	400	50	4
10	8.45 p. m	60	300	30	4
10	9.10 p. m	59	125	20	3
10	10.30 p. m	58	150	20	3
10	11.05 p. m	58	25	3	4
10	12.00 p. m	60	75	5	3
11	7.30 a. m	54	125	20	7
11	7.45 a. m	58	200	30	7
11	1.40 p. m	88	150	28	7
11	7.30 p. m	60	260	60	21

Record of seining operations conducted at Baird, Cal., &c.—Continued.

Date.	Hour.	Temperature of air.	Fish taken.		Ripe fish, females.
			Males.	Females.	
		°			
Sept. 11	9.00 p. m	55	200	50	1
11	10.00 p. m	55	300	20	7
11	10.45 p. m	54	200	10	5
11	11.30 p. m	51	100	5	.....
12	7.45 a. m	60	150	25	14
12	9.00 a. m	65	100	15	7
12	2.00 p. m	98	450	50	15
12	7.00 p. m	61	200	14	9
12	8.45 p. m	61	150	10	7
12	9.40 p. m	60	200	7	5
12	10.30 p. m	58	100	12	5
12	11.30 p. m	54	150	6	2
13	7.40 a. m	58	250	20	19
13	8.00 a. m	62	150	30	8
13	6.30 p. m	65	300	20	13
13	7.10 p. m	64	150	10	4
13	8.00 p. m	60	100	25	8
13	8.30 p. m	59	75	5	1
13	10.00 p. m	55	75	4	4
13	11.00 p. m	52	100	10	6
14	8.00 a. m	70	100	15	8
14	9.30 a. m	84	75	10	6
14	9.45 a. m	86	300	30	9
14	6.30 p. m	69	150	15	11
14	7.20 p. m	65	200	10	8
14	8.00 p. m	61	150	10	9
14	9.30 p. m	59	100	5	4
14	10.10 p. m	57	75	6	2
14	11.00 p. m	56	50	5	5
14	11.45 p. m	55	50	8	5
15	8.05 a. m	68	75	14	9
15	8.15 a. m	70	100	28	13
15	10.00 a. m	80	300	25	13
15	2.00 p. m	96	200	40	19
15	7.00 p. m	67	200	15	11
15	7.35 p. m	65	100	6	5
15	8.20 p. m	61	150	14	10
15	9.00 p. m	60	200	23	13
15	9.50 p. m	60	150	7	4
15	10.40 p. m	58	175	12	7
15	11.45 p. m	56	100	8	4
16	7.45 a. m	62	50	15	15
16	9.45 a. m	80	75	20	12
16	10.15 a. m	88	300	60	38
16	7.00 p. m	65	200	17	7
16	7.50 p. m	60	100	4	1
16	8.40 p. m	59	200	10	8
16	9.20 p. m	55	100	10	6
17	3.30 a. m	49	75	15	7
17	4.30 a. m	49	50	15	9
17	5.50 a. m	50	150	25	15
17	8.00 a. m	60	25	6	2
17	8.10 a. m	62	40	8	6
17	9.30 a. m	81	50	9	4
17	10.00 a. m	80	50	10	5
20	2.00 p. m	82	125	5	5
20	2.15 p. m	84	75	4	1
20	2.45 p. m	86	100	10	4
20	3.45 p. m	86	125	10	4
20	4.40 p. m	78	30	8	2
20	6.55 p. m	62	150	20	10
20	7.45 p. m	60	75	7	4
20	8.20 p. m	58	80	9	5
20	9 00 p. m	56	90	9	6
21	8.05 a. m	58	80	11	8
21	8.20 a. m	64	50	7	5
21	10.00 a. m	78	50	6	6
21	10.10 a. m	80	50	2	2
21	11.00 a. m	82	75	6	4
21	1.40 p. m	85	175	30	20
21	2.05 p. m	87	10	7	4