

XII.—REPORT OF OPERATIONS AT THE UNITED STATES SALMON-
HATCHING STATION ON THE M'CLOUD RIVER, CALIFORNIA,
IN 1877.

BY LIVINGSTON STONE.

CHARLESTOWN, N. H., *April 5, 1878.*

Hon. SPENCER F. BAIRD:

SIR: I beg leave to report as follows: When I first reached the McCloud River this season, on the 6th of June, I found everything on the grounds in good order; the usual winter's work of getting in wood for the summer, making nets, &c., had been faithfully attended to by Mr. Myron Green, who had remained in charge during my absence. The high water in the river, however, had carried away the current wheel which raised the water supply for the hatching house, and also the piers on which the wheel rested. In order to avoid a similar calamity this year, I at once adopted the plan of resting the wheel on large flat boats made of plank. This plan was ultimately carried out, and up to the time of the present writing has worked admirably. Indeed, I have just received a letter from Mr. Green, dated United States Fishery, McCloud River, California, January 14, 1878, stating that "the boats and wheel were a perfect success." The boats, together with the wheel, rise and fall with the water, so that any rise in the river does not endanger the wheel or interrupt its working. We gain a double advantage from this method, by not only assuring security to the wheel, but also by obtaining a continuous and permanent supply of water for irrigation, which, as we expect to have a large vegetable garden at the fishery in future, is a matter of no small importance.

The operations at the fishery in other respects this season were conducted very much the same as last year, with the exception that two racks were put across the river to obstruct the salmon instead of one, as usual. To explain why this step was required, it will be necessary to go back two or three years in the history of the fishery. On the 9th of December, 1875, President Grant set aside, by proclamation, a tract of land, including the premises of the McCloud River Fishery, as a United States reservation. For some time previous to this event, a Mr. Leschinsky and son had come over to the McCloud River from Shasta to catch salmon with a seine, and sell them in Shasta and neighboring markets. In consequence of having done this, these fishermen somehow acquired the impression that they had established a title to the land on which the United States Fishery was situated. Consequently, when the United States Fishery premises were made a government

reservation, they disputed the right of the United States Fish Commission to carry on its fishing operations there. This opened a warm controversy, which was carried on for over two years, during which time several unpleasant and rather exciting altercations took place. I was, nevertheless, able, in one way or another, to maintain the rights of the United States Fish Commission in the matter until the land was surveyed. When this was done, by some accident the disputed territory, to our great dismay, was made to come outside of the limits of the United States reservation. I saw the danger at once. Mr. Leschinsky now had, to all appearances, a legal right to keep us off the fishing grounds; and of course, if he did so, no salmon could be obtained for spawning, and the season's labors would be a failure, unless some new plan of operations obviating the difficulty was put into practice. It was this that led to the building of the additional rack just mentioned. Seeing that, in the existing situation, we should be cut off from securing the salmon when they collected below the usual location of our rack, I immediately proceeded to build a rack higher up the river, at a point which would cause some of the salmon at least to collect on what was unquestionably the reservation premises according to the survey, so that if we should not get any spawning salmon from the usual fishing ground, the season would not be an entire failure. This rack was finished, and the river closed to the ascent of the salmon above this point, on the 11th of July. The leaving out of the fishing ground from the reservation proved afterward to be the result of a clerical error, which was rectified during the summer, and the regular fishing ground having been restored to the United States Fish Commission, I then built the usual rack at its accustomed place.

In the mean time the United States had brought a suit against the Leschinskys for trespassing on government property, and in a conversation with them on the subject they expressed themselves willing to desist from fishing out the spawning salmon which were collecting on the fishing ground. As long as I remained at the McCloud, they appeared disposed to comply with my wishes in this respect. As soon, however, as I left the river they began to fish again, and on my arrival at Portland, Oreg., I received a dispatch from Mr. Green, who was left in charge at the McCloud River, stating that the Leschinskys were fishing again on the reservation and had expressed a determination to continue to fish there as long as they pleased. Under these circumstances I concluded to do what I had had for a long time in contemplation, viz, to apply for a small guard of soldiers to occupy the reservation fishing grounds during the fishing season. My object in doing this was threefold. In the first place, it would secure beyond any doubt the safety of the spawning salmon, and, in the second place, it would impress upon the minds of the community about there the fact that the fishery grounds were United States property, a circumstance which seemed to be very coolly ignored in some portions of our neighborhood.

My third and chief reason for having a military guard on the reservation was to avoid a collision between the Leschinsky party and my own; not that I thought that we were not strong enough to overpower the opposing party, if necessary, but I wanted to avoid this very necessity, and in case of trouble, instead of engaging in a personal quarrel, to throw the burden of defending the rights and property of the United States upon those whose business it was to render such defense.

On the 16th of August the soldiers arrived, a lieutenant and four men; and from that time our breeding salmon were not molested. On the 1st of October the United States marshal removed Mr. Leschinsky and son from the reservation.

This matter was hardly set right before another difficulty, quite as serious, presented itself. When the time came, about the 1st of September, for our large run of salmon to appear in the McCloud, we were very much disappointed and not a little alarmed to find that the salmon came in extremely small numbers, although, owing to the supply of young salmon which we put in the river three years ago, there was an unusually large number running in the Sacramento. At first we could not understand it. The mystery was soon solved, however, by the discovery that parties engaged in the business of canning salmon on the Sacramento were continuing to fish illegally beyond the close time assigned by the law of the State. As this fishing is done with great numbers of drift-nets at a time, about every salmon on the river of any considerable size is caught; and, in consequence of this, only a few stragglers which escaped the nets of the canners had reached the McCloud hatching station. Here was real cause for alarm; for if this illegal fishing were not stopped immediately, nearly all the spawning salmon for the season would be intercepted at the canneries, and very few would reach the McCloud River to furnish eggs for the hatching establishment. In this emergency the California Fish Commissioners came to the rescue, and with their characteristic energy and resolution stopped the illegal fishing, and pushed the suit against the canners with so much vigor that in less than six weeks they were tried, convicted, and fined to the amount of nearly a thousand dollars.

It was too late, however, for us to retrieve our losses at the fishery. The salmon that we should have had to yield our annual harvest of eggs were already in the tin cans of the law-breaking cannery men, and we had to make the best of the comparatively few breeders which succeeded in reaching the McCloud. At this juncture, the first rack which was built across the river, under a misapprehension, and which had been looked upon as a useless expenditure, played a most serviceable part; for, as has been mentioned, this rack closed up the river the 11th of July, which is much earlier than the river is usually obstructed. The consequence was that quite a large number of salmon collected below this rack before the regular rack was put across, and formed a reserve of which we now very gladly availed ourselves, and without which

we should have taken a very scanty supply of eggs. As it was, we began spawning the salmon on the 28th of August, on which day we obtained 28,000 eggs, and continued taking eggs till the 19th of September, when we took the last of the regular season's supply. We continued fishing, however, to procure a supply of spawners for the eggs which were to go to Australia and New Zealand, it being necessary to take these just twenty days before the Australian steamer sails from San Francisco, so that they will, at starting, be neither so young that they cannot be packed without injury, nor so far advanced that they will hatch out on the journey. These eggs were all taken on the 18th and 19th of September.

The experiment, which was tried for the first time last year, of shipping the salmon across the continent in a refrigerator-car, or rather a common box-car filled with ice, proved a very marked success; hardly more than two per cent. of the eggs being killed by the journey. I decided, therefore, to use the same method of transportation again this season, and on the 26th of September Mr. Pratt went to Sacramento for the car and brought it to Redding, where it was loaded during the 29th and 30th of September and 1st of October, and from which point it was dispatched on the 2d day of October with the passenger-train for Sacramento. On the same afternoon it left Sacramento with the overland passenger-train, and reached Chicago on the 7th of October, where the crates containing the eggs were received and forwarded by the United States Express Company to their various points of destinations. I will give a short quotation below from Mr. Pratt's letter in regard to loading the car:

"UNITED STATES FISHERY, *October 4, 1877.*

"MY DEAR MR. STONE: I went down to Sacramento on the 26th, but left here on the 25th, as it was necessary for me to stop at Stillwater and see about the teams that were to haul the eggs to Redding, as we had not received an answer from one of the parties (Mr. Smithson). I mailed the letters to the consignees the 26th from Redding. On arriving at Sacramento I found the car already there, but there was no use in taking it up to Redding until the next day.

"On the morning of the 28th I had the car sent around to the ice-house, and, having secured permission from the railroad authorities, had the ice all packed in one end of the car, 6½ tons, and used thirteen barrels of sawdust to pack around it. On reaching Redding you could not see that the ice had melted a particle. I found three loads of salmon eggs standing on the platform at the freight depot, and after packing with ice the one crate going by express to Salt Lake City, I went to work and loaded the remaining crates into the car and iced them all. Had engaged a man to help me, and to look after the car while it remained at Redding.

"Mr. O'Brien had brought down one load and he assisted us in pack-

ing. The next morning I came out to the fishery on one of the teams, staid here until the next night, and then went down on the stage to Redding, where, on arriving, I found the three teams were there before me and unloaded. So we went right to work and loaded the crates into the cars, and filled the ice chambers. Then I went to bed, just at daylight, and slept a few hours, and in the afternoon we worked in the car, refilling the ice chambers that had been filled on the first day the car reached Redding, and packing a box of specimens of trout and young salmon for the Smithsonian Institution. There were five jars, and I packed them solidly in sawdust, and marked them Prof. S. F. Baird, Smithsonian Institution, Washington, D. C., in full.

"The ice in the chambers filled two days before had melted only a little, but I went over them all, and gave them all the ice they would take. I packed the crates on both sides of the car, leaving a passage-way the whole length in the center. Piled ice on top of the crates nearly to top of car, in some places quite; then had several cakes left, which I put in the passage-way and on the small crates which were put there too. Returned to Sacramento on the 2d, having sent telegrams to all the consignees. Had the car taken around to ice-house and took on only a little over a ton of ice, as there was no room for any more without blocking up the whole car, which I could not think was necessary.

"Besides the salmon eggs which consisted of thirty-nine crates, to be distributed by the express company, there were twelve crates for Mr. Fred Mather to take charge of. We understood from Professor Baird's telegram that he wanted the eggs for Europe packed in separate lots of 25,000 each, and so packed them. We gave the Netherlands 100,000, as he directed; England, 50,000; France, 50,000; Germany, 50,000; Prussia, 50,000. The orders Professor Baird sent we cut down about 50 per cent.; that is, the larger ones. Those for 50,000 and 100,000 we did not cut down.

"Very truly, yours,

"KIRBY B. PRATT."

On the 7th of October the eggs for New Zealand and Australia were sent to San Francisco to go on the steamer leaving that point on the 9th of October.

In the mean time and as long as the state of the river permitted, Mr. Green continued to fish and take eggs, and succeeded so well that several new lots were sent off and a balance of over 2,000,000 left to be hatched and returned to the tributaries of the Sacramento.

It may not be out of place to mention here that although the salmon are increasing in the Sacramento,* it is nevertheless true that the yearly

* "Salmon have been more plentiful in the Sacramento this year than ever before, and never has such a vast quantity of salmon been taken."—(Letter from Hon. B. B. Redding, secretary of California Fish Commission, dated October 1, 1877.)

supply of young fish comes mainly from the hatching station on the McCloud River, and that consequently that supply must be kept up. If this is neglected the Sacramento will be depleted of salmon, and the efficiency of the salmon hatching station on the McCloud will be very much impaired, if not entirely destroyed. It accordingly becomes imperative on the part of the *United States Fish Commission* to return to the tributaries of the Sacramento a certain number of young salmon annually, say from 1,000,000 to 2,000,000, to maintain its own existence.

As the California fish commission will cheerfully pay the cost of hatching the salmon allowed for this purpose, I cordially recommend that this be done every year.

In concluding, I will say that the reports from the parties receiving salmon eggs from the McCloud station last year were extremely satisfactory in regard to the condition of the eggs on arrival at their destinations. With the exception of a small lot sent to the New York Aquarium, I believe the loss in transportation did not exceed $2\frac{1}{2}$ per cent. Even the eggs which were sent eight thousand miles and across the equator to New Zealand and Australia, arrived in fine order and with very slight loss.

In confirmation of the above statements, I take the liberty to present the following letters received from several gentlemen to whom California salmon eggs were consigned last year and the year previous:

OFFICE OF FISH COMMISSIONERS, STATE OF MINNESOTA,
Saint Paul, October 9, 1876.

DEAR SIR: The salmon eggs assigned to our State came safely on the 5th, and were *in fine condition*, for which accept our thanks.

Very respectfully,

R. O. SWEENEY,
Chairman Fish Commission.

LIVINGSTON STONE, Esq.,
United States Fishery, Redding, Cal.

NEW HOPE, PA., October 9, 1876.

DEAR SIR: I received the 75,000 California salmon eggs on Thursday last; they were *in splendid order*, there being only 1,800 dead eggs in the lot; and have only lost since 142 eggs.

Truly yours,

J. B. THOMPSON.

LIVINGSTON STONE, Esq.

BELLEVILLE, ILL., *October 13, 1876.*

DEAR SIR: The Belleville Fishing Club received 100,000 California salmon eggs on the 5th instant. The eggs were well packed and *in excellent order*. They have been placed in the hatching-troughs, and are hatching very satisfactorily.

Most respectfully, yours,

LOUIS C. STARKEL.

LIVINGSTON STONE, Esq.,
Charlestown, N. H.

WESTPORT, FAIRFIELD COUNTY, CONN.,
October 16, 1876.

DEAR SIR: I am happy to inform you that our consignment of salmon eggs was received in good condition, *less than 2 per cent. being dead.*

Yours, truly,

E. M. LEES.

L. STONE, Esq.

MADISON, WIS., *December 11, 1876.*

DEAR SIR: The California salmon eggs are now hatched. *A better lot of eggs were never taken from fish.* You and your assistants are entitled to great credit for the skill and care with which they were handled.

Truly yours,

W. WELCH,
Fish Commission.

LIVINGSTON STONE, Esq.

OHIO STATE FISH HATCHERY,
Toledo, Ohio, October 13, 1877.

MY DEAR SIR: The consignment of 250,000 California salmon eggs reached me on Thursday last, October 9, in good condition, *not over one in five hundred being spoiled.* They were at once placed in the hatchery here, where they are doing well.

Very truly,

EMERY D. POTTER.

LIVINGSTON STONE, Esq.

ELGIN, December 17, 1877.

MY DEAR SIR: The California salmon eggs came in very nice shape and hatched with but small loss.

Yours,

W. A. PRATT.

LIVINGSTON STONE.

NEW HOPE, PA., January 16, 1878.

DEAR SIR: The salmon have all done unusually well this year.

Truly yours,

J. B. THOMPSON.

LIVINGSTON STONE, Esq.

When it is remembered that in the case of the consignments to the Eastern States the eggs were packed in the torrid climate of California and traveled, afterward, thirty-six hours within the limits of that State, during a part of which time they were often subjected to a temperature of 120° to 130° Fahrenheit, it will be acknowledged, I think, that the eggs stood the journey of 3,000 miles of rail after leaving California wonderfully well.

It is true that this season a large proportion of the eggs sent to France and Germany, and other points in Europe, arrived in poor condition; but this was undoubtedly the result of their not having been kept cold enough after reaching the eastern slope of the United States. The loss of the eggs could not with any show of reason be attributed to the packing, for it is perfectly obvious that a method of packing which will take California salmon eggs in fine order across the Equator almost 8,000 miles, to New Zealand and Australia, is amply competent to carry them in safety, in the cool month of October, the shorter distance across the Atlantic, the whole of which is included in the temperate zone. The trouble was that at some point *en route* the temperature of the crates of eggs was allowed to rise above the limit of safety, and that is destruction to salmon eggs *in transit*, no matter how they are packed. Had the European consignment of salmon eggs been kept *cold enough*, they would have not only arrived in good condition in Europe, but *could have been sent back to California in safety*.

I might offer a dozen proofs of this statement, but will confine myself to the following extract from a New Zealand paper in reference to the California salmon eggs sent to that country from the United States station at the McCloud River last fall, 1877:

[From the Lyttellon Times, Christchurch, New Zealand, November 14, 1877.]

"FISH CULTURE AT OPAWA.—The Wellington consignment of American salmon ova for Mr. Johnson arrived on Saturday last by the "Rotura."

"The *splendid condition* in which they have arrived reflects great credit on those in America who had charge of the collecting and packing, which, in several respects, is an improvement on the English method."

Mr. Myron Green and Mr. Kirby B. Pratt, acting under my instructions, carried on the work at the McCloud River during my absence in Oregon, and deserve great credit for the faithful and efficient manner in which they executed their labors, and also for the very successful results which were accomplished.

It is worth noticing in the table of applications for 1877, and at the same time it reflects very creditably upon the usefulness of the United States station of the McCloud River, that although upward of 30,000,000 salmon eggs have been distributed from there, the demand still very much exceeds the supply.

Table of temperatures taken at the United States salmon-breeding station, McCloud River, California, during the season of 1877.

Date.	Air.				Water.			Wind.			Weather.
	Shado.		Sun.		7 a. m.	3 p. m.	7 p. m.	7 a. m.	3 p. m.	7 p. m.	
	7 a. m.	3 p. m.	7 p. m.	3 p. m.							
1877.	°	°	°	°	°	°	°				
May											
1	49	78	62	102	50	56	55				Clear.
2	47	83	62	102	50	55	54				Cloudy.
3	58	87	64	114	51	57	56				Clear.
4	60	81	68	110	51	57	56				Do.
5	63	86	64	108	52	58	57				Do.
6	52	76	63	100	52	58	57				Windy and cloudy.
7	46	56	46	.....	50	53	52				Thunder shower.
8	41	54	52	96	48	51	50				Rainy.
9	44	70	60	102	48	54	53				Cloudy.
10	53	80	62	110	50	56	55				Do.
11	50	84	63	116	52	57	56				Clear.
12	53	66	60	.....	52	55	54				Do.
13	52	60	52	.....	51	52	51				Cloudy ; p. m. rainy.
14	50	58	64	.....	49	54	54				Cloudy.
15	52	64	56	.....	51	51	53				Cloudy ; p. m. rainy.
16	50	71	66	.....	50	54	54				Cloudy.
17	58	78	58	92	52	56	56				Do.
18	50	78	62	102	51	56	55				Windy.
19	56	74	62	98	50	57	56				Clear.
20	51	62	58	.....	51	52	52				Do.
21	49	58	50	.....	49	52	52				P. m. windy.
22	45	66	50	80	47	52	52				Cloudy.
23	52	76	60	100	48	56	55				Do.
24	52	80	64	104	50	56	55				Clear.
25	53	75	62	.....	51	57	56				Do.
26	60	74	61	90	52	58	57				Do.
27	58	76	62	100	52	57	56				Cloudy.
28	45	52	51	.....	51	52	51				P. m. cloudy.
29	50.	64	50	.....	50	54	53				Clear.
30	54	71	60	95	50	55	54				Do.
31	60	74	62	104	50	57	56				Do.
1	65	87	61	108	52	58	57				Do.
2	63	76	69	104	52	58	57				Do.
3	61	84	70	108	52	56	56				P. m. cloudy.
4	64	76	74	.....	53	58	57				Do.
5	64	82	64	108	52	59	58				Clear.
6	63	83	76	109	53	59	58				Do.
7	52	90	70	113	54	58	58				Do.
8	52	94	74	118	54	60	59				Do.
9	54	99	76	124	58	62	62				Do.
10	68	100	84	126	54	62	62				Do.
11	56	102	86	124	56	62	62				Do.
12	76	100	75	126	56	62	61				Do.
13	74	96	78	125	55	62	61				Do.
14	62	96	74	123	54	62	61				Do.
15	61	91	72	112	54	61	60				Do.
16	63	82	71	107	55	61	60				Do.
17	62	90	70	115	55	62	61				Do.

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Table of temperatures taken at McCloud River, California, &c.—Continued.

Date.	Air.				Water.			Wind.			Weather.
	Shade.		Sun.		7 a. m.	3 p. m.	7 p. m.	7 a. m.	3 p. m.	7 p. m.	
	7 a. m.	3 p. m.	7 p. m.	3 p. m.							
1877.	°	°	°	°	°	°	°				
June 18	68	89	72	106	55	62	61				Clear.
19	68	88	70	116	55	62	61				Do.
20	69	91	70	119	55	61	60				Do.
21	66	88	73	112	55	61	60				Do.
22	63	83	74	110	54	61	60				Do.
23	66	81	68	106	54	61	60				P. m. cloudy.
24	63	83	70	104	53	59	58				Do.
25	67	84	64	104	52	58	58				Rain.
26	62	70	63	.....	52	56	58				Do.
27	56	54	54	.....	52	52	52				Cloudy.
28	54	62	56	86	50	53	53				Clear.
29	56	73	64	93	50	57	56				Do.
30	60	79	68	103	53	60	60				Do.
July 1	62	84	69	110	53	60	59				Do.
2	66	84	76	102	54	60	60				Clear; p. m. cloudy.
3	60	70	64	92	54	59	58				Clear.
4	66	73	64	100	52	58	57				Do.
5	58	78	68	96	53	58	58				Do.
6	60	82	70	110	52	59	59				Do.
7	66	89	70	110	54	60	59				Do.
8	63	90	72	110	53	60	60				Do.
9	63	91	74	115	54	60	60				Do.
10	60	89	82	122	54	60	60				Do.
11	62	94	78	136	55	61	61				Do.
12	72	98	80	124	54	62	62				Do.
13	78	102	81	134	56	63	63				Do.
14	80	98	86	124	56	62	62				Do.
15	76	92	80	110	56	62	62				Cloudy and rainy.
16	72	76	75	.....	56	59	59				Rainy.
17	68	90	76	122	56	60	60				Clear.
18	72	93	92	121	56	62	62				Do.
19	76	96	78	128	56	62	62				Cloudy.
20	71	88	81	.....	56	59	59				Clear.
21	76	96	90	114	54	60	60				Do.
22	79	95	87	121	55	61	60				Do.
23	75	97	83	125	56	61	61				Do.
24	68	96	80	123	56	61	61				Do.
25	72	93	78	116	56	61	61				Do.
26	64	95	78	126	56	61	61				Do.
27	68	100	79	130	56	61	61				Do.
28	69	96	77	123	56	61	61				Do.
29	71	90	80	107	56	61	61				Do.
30	71	89	78	117	55	60	60				Do.
31	70	94	76	120	56	60	60				Do.
Aug. 1	64	95	74	117	54	60	60	S. W.	S. W.	Calm.	Do.
2	60	84	79	112	54	60	60	S. W.	S. W.	Calm.	Do.
3	62	84	79	107	54	60	60	S. W.	S. W.	Calm.	Do.
4	70	92	75	120	54	60	60	N. W.	S. W.	S. W.	Do.
5	66	93	74	123	54	60	59	S. W.	S. W.	Calm.	Do.
6	63	95	73	124	54	60	59	S. W.	S. W.	Calm.	Do.
7	58	96	74	119	54	60	60	S. W.	S. W.	Calm.	Do.
8	54	90	72	110	54	59	58	S. W.	S. W.	Calm.	Do.
9	63	91	72	108	54	58	58	N. E.	Calm.	Calm.	Cloudy and sultry.
10	53	92	75	114	52	58	58	N. E.	S. W.	Calm.	Clear.
11	49	94	73	116	53	59	59	N. E.	S. W.	Calm.	Do.
12	56	96	72	118	53	58	58	N. E.	S. W.	Calm.	Do.
13	60	96	73	122	53	58	58	N. E.	S. W.	Calm.	Do.
14	56	98	76	125	53	59	59	N. E.	S. W.	Calm.	Do.
15	61	96	74	117	54	59	59	N. E.	N. E.	Calm.	Do.
16	56	92	76	117	53	58	58	S. W.	S. W.	S. W.	Cloudy.
17	59	92	72	114	53	58	58	Calm.	S. W.	S. W.	Thunder and lightning; at night clear.
18	55	92	72	109	54	59	50	Calm.	Calm.	S. W.	Clear.
19	52	88	72	113	53	59	59	S. W.	S. W.	Calm.	Do.
20	50	88	80	106	54	58	58	N. E.	S. W.	Calm.	Do.
21	50	92	72	118	55	58	58	N. E.	S. W.	Calm.	Do.
22	50	89	72	104	54	58	58	N. E.	S. W.	Calm.	Do.
23	47	84	71	107	53	58	58	Calm.	S. W.	S. W.	Do.
24	49	62	60	.....	53	54	54	N. E.	N. E.	N. E.	Rain.
25	48	60	64	108	50	56	56	Calm.	S. W.	Calm.	Clear.
26	48	89	67	117	50	57	57	N. E.	N. E.	Calm.	Do.
27	45	92	63	113	50	56	56	Calm.	S. W.	Calm.	Do.
28	42	90	66	113	51	56	56	Calm.	S. W.	Calm.	Do.

SALMON HATCHING ON M'CLOUD RIVER, CALIFORNIA, 1877. 807

Table of temperatures taken at McCloud River, California, &c.—Continued.

Date.	Air.				Water.			Wind.			Weather.
	Shade.		Sun.		7 a. m.	3 p. m.	7 p. m.	7 a. m.	3 p. m.	7 p. m.	
	7 a. m.	3 p. m.	7 p. m.	3 p. m.							
1877.	°	°	°	°	°	°	°				
Aug. 29	52	74	63	100	52	55	55	Calm.	S. W.	Calm.	Rain; cloudy.
30	50	90	69	118	52	57	57	Calm.	S. W.	Calm.	Clear.
31	49	91	70	114	52	56	58	Calm.	S. W.	Calm.	Do.
Sept. 1	46	92	66	114	52	57	57	Calm.	N.	Calm.	Do.
2	49	94	70	118	52	57	57	Calm.	Calm.	Calm.	Do.
3	53	99	72	122	53	58	58	Calm.	N.	Calm.	P. m. cloudy.
4	56	100	79	124	53	58	58	Calm.	S.	Calm.	Clear.
5	54	94	70	118	54	58	58	Calm.	Calm.	Calm.	Do.
6	58	92	72	114	54	58	54	N.	N.	N. E.	Do.
7	55	94	70	123	52	57	57	N.	N.	N.	Do.
8	50	94	68	121	53	56	56	N.	N.	Calm.	Do.
9	51	93	72	110	52	56	56	Calm.	S. W.	Calm.	Clouds.
10	52	82	71	106	52	56	56	N. E.	N. E.	N. E.	Do.
11	50	78	74	104	52	54	54	N. E.	N. E.	N. E.	Do.
12	42	76	74	100	50	55	55	N. E.	N. E.	N. E.	Cloudy.
13	55	82	70	91	49	56	56	N. E.	N. E.	N. E.	Clear.
14	57	84	70	110	50	57	57	N. E.	N. E.	N. E.	Do.
15	56	91	72	116	51	57	57	N. E.	N. E.	N. E.	Do.
16	59	93	72	116	53	56	56	N. E.	N. E.	N. E.	Do.
17	57	96	70	124	52	56	56	N. E.	N. E.	Calm.	Do.
18	56	98	70	120	51	56	56	N. E.	S.	Calm.	Do.
19	52	92	68	116	51	56	56	N. E.	Calm.	Calm.	Do.
20	54	84	72	96	51	55	55	S. W.	S. W.	S. W.	Do.
21	49	84	62	106	50	55	55	S. W.	.....	Calm.	Slight clouds.
22	43	80	64	96	51	54	54	S. W.	.....	Calm.	Clear.
23	41	80	62	106	50	53	53	S. W.	.....	Calm.	Do.
24	42	82	60	100	49	52	52	N. E.	N. E.	Calm.	Do.
25	43	82	59	104	50	53	53	S.	N. E.	S. W.	Do.
26	46	84	67	110	50	54	54	N. W.	N. E.	S. W.	Do.
27	46	84	70	110	50	54	54	N. E.	N. E.	Calm.	Cloudy.
28	46	82	75	84	50	54	54	N. E.	N. E.	S. W.	Clear.
29	46	84	62	110	50	54	54	N. E.	N. E.	Calm.	Do.
30	42	80	56	108	49	52	52	N. E.	N. E.	N. E.	Do.
Oct. 1	54	74	62	107	49	52	52	S.	S.	N. E.	Do.
2	42	72	63	110	48	52	52	N. E.	N. E.	N. E.	Do.
3	44	73	60	103	48	52	52	N. E.	N. E.	Calm.	Do.
4	46	78	59	107	49	53	53	N. E.	N. E.	Calm.	Do.
5	48	84	68	106	49	53	53	N. E.	N. E.	Calm.	Do.
6	55	86	56	112	50	54	54	N. E.	N. E.	N. E.	Slight clouds.
7	56	88	62	118	50	54	54	N.	N. E.	N. E.	Do.
8	48	91	62	110	50	53	53	N. E.	N. E.	N. E.	Do.
9	46	86	62	112	49	54	54	N. E.	S. W.	N. E.	Cloudy.
10	44	83	74	88	49	52	52	N. E.	S. W.	S.	Do.
11	44	75	60	77	49	52	52	N.	S. W.	S. W.	Do.
12	44	66	60	.....	49	52	52	N.	S. W.	S. W.	Do.
13	54	70	56	.....	48	50	50	S. W.	S. W.	S. W.	Do.
14	43	80	54	102	48	51	51	S. W.	N. W.	Calm.	Do.
15	36	83	53	114	47	50	50	Calm.	N. W.	Calm.	Do.
16	42	80	54	112	46	49	49	N. E.	N. W.	Calm.	Do.
17	43	82	52	114	46	49	49	N. E.	N. W.	Calm.	Do.
18	42	80	50	110	47	50	50	N. W.	N. W.	Calm.	Do.
19	36	79	52	98	46	49	49	N. W.	W.	Calm.	Do.
20	36	70	53	.....	46	49	49	Calm.	S. W.	S. W.	A. m. rain; p. m. cl'dy.
21	50	63	54	81	47	49	49	S. W.	N. W.	S. W.	Do.
22	54	54	52	.....	48	49	49	S.	S.	S. W.	Cloudy.
23	50	59	56	.....	49	50	50	Calm.	S.	Calm.	Hazy; cloudy.
24	49	67	56	70	49	51	51	Calm.	S. W.	S. W.	A. m. rain; p. m. clear.
25	54	66	54	80	50	51	51	Calm.	N. E.	Calm.	Sun-shower; clear.
26	42	68	46	93	49	51	51	N. E.	N. E.	N. E.	Clear.
27	38	61	46	80	46	48	48	N. E.	N. E.	N. E.	Do.
28	32	61	46	82	44	46	46	Calm.	N. E.	N. E.	Do.
29	31	64	39	85	44	46	46	N. E.	N. E.	N. E.	Do.
30	32	65	40	84	44	46	46	N. E.	N. E.	N. E.	Do.
31	31	64	39	85	44	46	46	N. E.	N. E.	N. E.	Do.
Nov. 1	40	52	46	76	44	45	45	Calm.	W.	Calm.	Do.
2	48	48	48	.....	44	45	45	Calm.	S. W.	.....	Rain a. m.
3	46	52	46	.....	46	46	46	Calm.	S. W.	.....	Do.
4	48	50	50	.....	47	48	48	Calm.	S. W.	.....	Rain.
5	52	55	55	.....	43	48	48	S. W.	S. W.	.....	F.
6	38	56	54	.....	47	48	48	Fog	.....	S. W.	Cloudy.
7	38	64	50	83	46	48	48	N. E.	N. E.	N. E.	Clear.
8	41	65	51	46	48	48	N. E.	Clear a. m.; cl'dy p. m.
9	38	71	50	75	46	48	48	N. W.	N. W.	N. W.	Clear.

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Table of temperatures taken at McCloud River, California, &c.—Continued.

Date.	Air.				Water.			Wind.			Weather.
	Shade.			Sun.	7 a. m.	3 p. m.	7 p. m.	7 a. m.	3 p. m.	7 p. m.	
	7 a. m.	3 p. m.	7 p. m.								
1877.	o	o	o	o	o	o	o				
Nov. 10	38	54	50	.....	44	46	46	S. W.	S. W.	S. W.	Cloudy.
11	48	53	47	.....	46	48	48	S. W.	S. W.	S. W.	Rain.
12	36	61	47	70	46	48	48	Fog	N.	.....	Clear.
13	34	54	47	.....	44	44	44	S. W.	.....	.....	Cloudy.
14	46	48	47	.....	46	46	46	S. W.	S. W.	.....	Rain.
15	48	54	53	.....	47	47	47	S. W.	S. W.	Calm.	A. m. rain; cl'ds p. m.
16	54	62	54	70	47	50	50	.....	W.	S. W.	Clear.
17	36	63	52	65	47	48	48	N. W.	N. W.	N.	Do.
18	44	63	50	73	46	43	48	N. W.	N. W.	N. W.	Do.
19	40	69	54	75	46	48	48	N. W.	N. W.	N. W.	Do.
20	37	70	42	75	45	46	46	N. E.	N. W.	Calm.	Cloudy.
21	42	59	50	.....	44	45	45	S. W.	S. W.	Calm.	Rain.
22	48	52	52	.....	46	47	47	S. W.	S. W.	S. W.	Clear.
23	53	62	50	67	48	48	48	N.	N.	S. W.	Do.
24	36	61	50	66	46	47	47	N. W.	.....	Calm.	Do.
25	36	62	48	63	46	47	47	N. W.	N. W.	Calm.	Do.
26	38	61	50	65	45	47	47	N. W.	N. W.	Calm.	Do.
27	36	70	52	75	45	47	47	N. E.	N. E.	Calm.	Do.
28	40	73	44	81	44	46	46	Calm.	N. W.	Calm.	Do.
29	40	72	46	80	44	46	46	Calm.	N. W.	Calm.	Do.
30	32	67	42	71	44	46	46	Calm.	N.	Calm.	Do.
Dec. 1	40	59	40	64	44	46	46	Calm.	N.	.....	Do.
2	33	64	38	73	44	46	46	.....	N. W.	N. W.	Do.
3	28	64	40	74	43	44	44	.....	.....	.....	Do.
4	40	65	40	80	42	44	44	S. W.	.....	.....	Do.
5	26	62	36	82	41	43	43	N. W.	.....	.....	Do.
6	28	63	37	81	41	43	43	.....	N. W.	.....	Do.
7	31	64	39	76	41	43	43	N. W.	N. W.	.....	Do.
8	30	64	41	76	41	43	43	.....	N. W.	.....	Do.
9	38	59	38	68	41	43	43	.....	S. W.	S. W.	Do.
10	38	59	40	76	41	43	43	.....	N. E.	S. W.	Do.
11	38	46	40	.....	42	44	44	S. W.	S. W.	S. W.	Rain.
12	38	59	38	68	43	45	45	S. W.	S. W.	S. W.	Do.
13	40	60	40	72	44	46	46	S. W.	.....	.....	Clear.
14	42	63	40	74	44	46	46	.....	.....	.....	Do.
15	42	62	41	82	44	46	46	.....	.....	.....	Do.
16	40	45	40	.....	44	46	46	.....	.....	.....	Rain.
17	39	48	42	.....	44	46	46	.....	.....	.....	Do.
18	39	59	40	76	44	46	46	.....	.....	.....	Clear.
19	38	50	48	.....	45	46	46	.....	S. W.	S. W.	Fog.
20	38	56	50	.....	45	46	46	S. W.	S. W.	S. W.	Fog; cloudy.
21	47	52	47	65	47	48	48	S. W.	Calm.	.....	Fog and rain.
22	35	44	44	.....	45	46	46	.....	.....	.....	Rain.
23	37	41	40	.....	45	45	45	.....	.....	.....	Clear.
24	36	56	38	72	44	45	45	.....	.....	.....	Cloudy.
25	36	48	40	.....	44	45	45	.....	.....	.....	Do.
26	32	53	40	.....	44	45	45	N. E.	N. E.	.....	Clear.
27	36	57	36	72	43	44	44	N. W.	N. W.	.....	Do.
28	26	56	36	70	41	43	43	N. E.	N. E.	N. E.	Do.
29	29	58	36	70	41	43	43	N. E.	N. E.	N. E.	Do.
30	32	56	35	70	41	43	43	N. E.	N. E.	N. E.	Do.
31	25	50	30	68	40	42	42	N. W.	N. W.	N. W.	Do.

SALMON HATCHING ON M'CLOUD RIVER, CALIFORNIA, 1877. 809

Table of salmon eggs taken at the United States breeding station, McCloud River, California, during the season of 1877.

Date.	Number of eggs taken.	Total number of eggs taken.	Number of salmon spawned.	Total number of salmon spawned.	Date.	Number of eggs taken.	Total number of eggs taken.	Number of salmon spawned.	Total number of salmon spawned.
Aug. 21	5,000	.....	1	.....	Sept. 10	322,000	3,456,000	73	818
23	4,000	.....	1	.....	11	420,000	3,876,000	105	923
25	19,000	.....	4	.....	12	708,000	4,584,000	164	1,087
28	65,000	.....	17	.....	15	471,000	5,055,000	124	1,211
30	121,000	.....	32	.....	17	225,000	5,280,000	58	1,269
31	185,000	.....	42	.....	19	240,000	5,520,000	59	1,328
Sept. 1	246,000	.....	63	.....	20	148,000	5,668,000	36	1,364
2	266,500	.....	63	.....	21	72,000	5,740,000	18	1,382
3	226,500	.....	54	.....	22	89,000	5,829,000	25	1,407
5	519,500	.....	114	.....	24	84,000	5,913,000	20	1,427
6	296,000	.....	73	.....	26	41,000	5,954,000	11	1,438
7	321,000	.....	89	.....	28	59,000	6,013,000	15	1,453
8	384,000	.....	99	.....	Oct. 9	40,000	6,053,000	7	1,460
9	415,000	.....	93	.....	(*)	1,000,000	7,053,000	.....	.....

* Subsequent to October 9, daily record not kept. Number of eggs taken estimated at 1,000,000.

Table of distribution of salmon eggs from the United States salmon-breeding station, McCloud River, California, during the season of 1877.

State or country.	Consignee.	No. asked.	No. assigned.	No. forwarded.	Destination.
California	B. B. Redding, F. C.	500,000	300,000	200,000	Sacramento River.
Illinois	W. D. E. Andrus	50,000	50,000	50,000	George Lincoln, Rockford.
	W. A. Pratt, M. D.	100,000	100,000	50,000	Elgin.
Iowa	Belleville Fishing Club.	50,000	50,000	50,000	L. C. Starkol, Belleville.
	B. F. Shaw, F. C.	100,000	100,000	100,000	Anamosa.
Kansas	D. B. Long, F. C.	100,000	100,000	100,000	Ellsworth.
Kentucky	Industrial Exhibition ..	70,000	5,000	5,000	Pack Thomas, Louisville.
	William Griffith, F. C. ...	300,000	300,000	150,000	Louisville.
Massachusetts	E. A. Brackett, F. C.	300,000	300,000	100,000	100,000 to Winchester; 200,000 to Plymouth, N. H.
Maryland	T. B. Ferguson, F. C.	2,500,000	500,000	400,000	Baltimore.
Minnesota	R. O. Sweeny, F. C.	600,000	500,000	250,000	Saint Paul.
Michigan	George H. Jerome, F. C. ...	300,000	300,000	150,000	Niles.
New Jersey	J. R. Shotwell, F. C.	500,000	500,000	250,000	Mrs. J. H. Slack, Bloomsbury.
New York	R. B. Roosevelt, F. C. ...	200,000	200,000	100,000	Calectonia (State hatching-house).
	H. H. Porter	10,000	10,000	10,000	Half Way, Onondaga County.
New Hampshire	Samuel Wobber, F. C.	200,000	200,000	100,000	See E. A. Brackett, Massachusetts.
Nebraska	J. G. Roman	10,000	10,000	10,000	South Bend.
Ohio	Emery D. Potter, F. C. ...	500,000	500,000	250,000	Toledo.
Pennsylvania	James Duffy, F. C.	400,000	400,000	200,000	325,000 to J. P. Creveling, for James Duffy, Marietta; 75,000 to South Weeks, Corry.
	J. B. Thompson	50,000	50,000	50,000	New Hope.
	do	100,000	100,000	100,000	For W. J. Game Protective Society.
	do	30,000	30,000	30,000	For Mr. Porter.
Virginia	A. Moseley, F. C.	100,000	100,000	100,000	Col. M. McDonald, Lexington, via Lynchburg.
Wisconsin	N. K. Fairbank	300,000	150,000	200,000	Genova Lake.
	C. F. Reed	20,000	20,000	20,000	Reedsburg, Sauk Co.
Utah	William Welch, F. C.	175,000	175,000	100,000	Madison Fish Hatchery.
North Carolina	A. P. Rockwood, F. C. ...	150,000	150,000	100,000	Groat Salt Lake City.
Prussia	L. L. Polk, F. C.	500,000	500,000	250,000	Raleigh.
Germany	Government	50,000	50,000	50,000	Minister of agriculture.
	Mr. von Beur	50,000	50,000	50,000	Schmalkow and Grolfswald.
Netherlands	C. B. Bottomano	250,000	100,000	100,000	Royal Zoological Garden, Amsterdam.
England	Frank Buokland	50,000	50,000	50,000	England.

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Table of distribution of salmon eggs, &c.—Continued.

State or country.	Consignee.	No. asked.	No. assigned.	No. forwarded.	Destination.
France .....	.....	50,000	50,000	50,000	Société d'Acclimatation.
Canada	Minister of Marine and Fisheries.	500,000	500,000	150,000	S. Wilnot, Newcastle, Ontario.
Australia	Sir Saml. Wilson, prest.	50,000	50,000	50,000	Caro J. C. Frisby, care
New Zealand	Colonial Secretary, Wellington.	500,000	500,000	500,000	Cross & Co., San Francisco: Auckland, 100,000. Napier, 50,000. Nelson, 50,000. Greymouth, 50,000. Wellington, 50,000. Canterbury, 50,000. Dunedin, 50,000. Southland, 100,000.
Oregon .....	.....	300,000	300,000	300,000	Columbia River.
California	Sportsman's Club	250,000	250,000	250,000	Lake Merced.
	California Fish Commission.	2,000,000	2,000,000	2,000,000	Tributaries of Sacramento River.
France	Baron de Harber	10,000	8,000	8,000	France.
	Total distributed			6,983,000	