

XI.—REPORT OF OPERATIONS AT THE UNITED STATES SALMON-HATCHING STATION ON THE M'CLOUD RIVER, CALIFORNIA, DURING THE SEASON OF 1880.

By LIVINGSTON STONE.

CHARLESTOWN, N. H., *December 31, 1880.*

Prof. SPENCER F. BAIRD,  
*United States Commissioner:*

SIR: I beg leave to report as follows: I reached the McCloud River this year on the 22d of June and found everything at the salmon fishery in as good condition as could be expected after eight months exposure to the heat and cold, rains, snows, and droughts of a California mountain climate. The country looked beautifully, owing to the late spring rains. The McCloud River was still 18 inches above the usual summer level, and the water was unusually cold for the season, being only 53° against 57° of last year at the same time.

The salmon were more abundant than ever, the river seeming to be full of them. As an illustration of their abundance I mention the fact that on the 21st of July, before the rack or any obstruction had been put in the river, we caught 150 salmon at one haul of a very small net.

The piers of the last year's bridge remained in position in the river, though in a somewhat damaged condition. The current wheel and the flat-boats on which it rests had been drawn inshore during the high water by Mr. James A. Richardson, who had charge of the salmon-hatching station through the winter. The wheel and boats had sustained very little damage.

Our first labors this season consisted in doing the necessary white-washing and painting, in caulking and pitching the flat-boats, and in putting the wheel in thorough repair. We next proceeded to build the usual rack and bridge across the McCloud River. My instructions being to take five or six million salmon this year, I did not hurry to get the bridge in as early as usual. For the last two or three years the river has been bridged by the 4th of July. This year I did not close up the river to the salmon till the 1st of August.

Another change in regard to the bridge and rack this year consisted in using stakes split out from old-growth fir instead of the small round pine poles used hitherto. Poles are getting so scarce now in the vicinity of the fishery that we have had to go several miles for them the last two or three years, which was of course a great disadvantage. Being

saplings, also, the poles became weak and very brittle after one season's use, and could not be relied upon to do service more than one year, which was, of course, another disadvantage. By making the rack of fir stakes cut from old-growth trees we hope not only to save expense, but to make the rack wear a year or two longer than the former racks have done.

I cannot speak in too high terms of the character of the work which some of the Indians do for us. There are now nearly a dozen of them who have been with me, more or less, since I came to the McCloud River, who are splendid workers. They are faithful, steady, industrious, and very intelligent. During my first year here I gave all the Indians the same pay; now I discriminate between the best workers and the others, and give the higher class 25 or 50 cents a day more than the rest. This little addition to their pay, or probably the distinction which it implies, affects them perceptibly, and it becomes quite conspicuously a matter of pride with them to make their work correspond with their increased pay.

After the closing of the river to the ascending salmon was made secure beyond a doubt, we turned our attention more particularly to the special preparations for catching the salmon and putting everything about the place in satisfactory shape. The California climate is such that a great deal of whitewashing and painting, and that very often, is necessary to keep a place of this sort looking as it ought to. Then there are the necessary repairs incident upon keeping up a half a dozen buildings and the thousand and one things to be done to put flumes, hatching-troughs, trays, filtering tanks, &c., in order. Besides doing all these things we built a wagon road to the garden and another from the house to the stage road. The corrals were put in the river at the fishing ground, and the spawning-house built with its apparatus for taking salmon eggs. We also did a good deal of hard work on the river trail opposite the house. This narrow trail, which in the Eastern States, would be called a bridle-path, extends along a rough, rocky, and precipitous hillside for fifty rods or so, and was positively unsafe. I myself have seen a horse and rider fall headlong over the cliff just opposite our front door. The horse fell fifty feet down to the water's edge and was killed. The rider fell about 20 feet and was saved by being caught against a tree.

By some hard digging and by the free use of giant powder we converted the trail into a safe and easy path.

On the 20th of August we found the first ripe female salmon. To save the trouble of taking small lots at a time, I postponed the taking of eggs until a sufficient number of spawning salmon appeared to authorize the beginning of steady work. This occurred on Monday, August 30, when we began the season's regular fishing for spawning fish. We did not begin to take eggs, however, until the next day, when we inaugurated the spawning season by placing 130,000 salmon eggs in

the hatching-house. From this time the taking of eggs proceeded with unusual steadiness until the night of the 14th of September, when we had taken 6,000,000 eggs, which was all that we wanted for the large hatching-house.

The men having worked for over two weeks, Sundays and all, we took a holiday on Thursday, September 16, which was passed in rifle-shooting, ball-playing, boating matches, and the like. On the morning of September 17 we began fishing again for the small hatching-house, but did not fish long, for we caught 167 spawning females at the first haul, and this being all that we wanted to keep in the corral through the day, we quit fishing until evening. In the evening we caught 108 more, and took a quarter of a million eggs. The next day we alternately fished and took spawn all day, taking three-quarters of a million eggs, which made one million in all for the supplementary hatching-house, which, being all that were needed for that house and making seven millions eggs in all as this year's harvest, we hung up our net and stopped fishing and taking eggs for this season.

I depended entirely this year upon horses for pulling in the lower rope of the seine, and have no hesitation in recommending their use for this work. After the season's regular fishing begins it requires nine men to pull in the lower rope properly, and even with this force it does not come in always as steadily or as quickly as it ought to. With two horses only two men are needed at this rope, so that the expense of employing seven men is saved, against which you have only to offset the use of two horses.

From this time till we began to pack eggs for distribution to their various destinations the time was taken up in making packing-boxes and crates, in washing and picking over the moss used for packing, in gathering ferns, and in attending to the maturing of the eggs. One other thing we did during this time which must not be forgotten. This was putting up the telephone, a memorable event in this unsettled Indian country. The telephone material arrived Tuesday evening, September 28, and the next evening we were talking between headquarters and the post-office building. The Indians were in great glee over it, and were soon talking to each other over the wires. They have been in the habit of calling our hydraulic ram "mame debbil" (water devil). They call the telephone "teen klesch" (talking spirit).

On Friday, October 1, we packed and crated 2,200,000 eggs, on Saturday 800,000, and on Sunday morning 800,000 more, making 3,800,000 in all, occupying 76 packing-boxes and 38 crates. These were taken in wagons to Redding, Cal., where our stage road connects with the California Pacific Railroad, and where I had a car waiting for them with several tons of ice. The crates of eggs having been safely stored away in the car and the ice chambers filled with ice, the balance of the ice was placed on the tops of the crates, and the car shackled on the train which left Redding for Sacramento and the East early Monday morning,

October 4. I accompanied the car to Chicago, where I turned over the car and eggs in good order to Mr. Ellis and other representatives of the United States Fish Commission who were there to receive them.

Below will be found the following tables, viz:

I. Table showing the temperature of air and water at the McCloud River station during the season of 1880.

II. Table showing the number of fish, &c., caught at each haul of the seine during the season of 1880.

III. Table showing the daily number of salmon eggs taken.

IV. Table showing the distribution of the eggs.

V. Table showing the actual planting of young California salmon hatched from eggs taken in 1878.

TABLE I.—Table of temperatures taken at the United States salmon-breeding station, McCloud River, California, during the season of 1880.

Month.	Air.				Water.			Forest temperature.	Wind.	Weather.
	Shade.		Sun.		7 a. m.	3 p. m.	7 p. m.			
	7 a. m.	3 p. m.	7 p. m.	3 p. m.						
June 1.	o	o	o	o	o	o	o			
June 2.										
June 3.										
June 4.										
June 5.										
June 6.										
June 7.										
June 8.										
June 9.										
June 10.										
June 11.										
June 12.										
June 13.										
June 14.										
June 15.										
June 16.										
June 17.										
June 18.										
June 19.										
June 20.										
June 21.										
June 22.	58		70		52		54		Clear.	
June 23.	58	90		112	52	53			Do.	
June 24.	57	87	70	112	54	54	50		Do.	
June 25.	58	88	70	114	53	54	56		Do.	
June 26.	62	94	76	116	54	55	50		Do.	
June 27.	64	95		118	54	50			Do.	
June 28.	62	90	72	115	54	54	50		Do.	
June 29.	54	92	71	116	54	53	56		Do.	
June 30.	50	96	79	119	54	50	50		Do.	
July 1.		96	79	122		50	56		Do.	
July 2.		98	75	122		56	56		Do.	
July 3.	63	100	77	124	54	57	56		Do.	
July 4.	69	94	79	120	54	56	57		Do.	
July 5.	56	94	75	118	55	57	57		Do.	
July 6.	58	93	75	114	54	58	57		Do.	
July 7.	58	93	79	118	55	58	58		Do.	
July 8.		91	76	117		58	58		Do.	
July 9.	62	93		116	55	57			Do.	
July 10.		81		116		56			Light clouds in p. m.	
July 11.	60	83	65	112	53	56	55		Clear.	
July 12.	65	94	72	116	53	50	56		Light clouds in a. m.	
July 13.	{ 7.30 } { 70 }	89		121	54	57			Clear.	
July 14.		104		126		58			150° in sun reflected heat.	
July 15.		107		132		58			Clear.	
July 16.	64	93		103	56	58			Decidedly cloudy nearly all day.	
July 17.		100		123		58			Clear.	
July 18.		97		122		59			Do.	

[5] SALMON-HATCHING STATION ON M'CLOUD RIVER, CAL. 601

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

Month.	Air.				Water.			Forest temperature.	Wind.	Weather.
	Shade.			Sun.	7 a. m.	3 p. m.	7 p. m.			
	7 a. m.	3 p. m.	7 p. m.	3 p. m.						
July 10	o	o	o	o	o	o	o	o		
July 20	95	93	57	121	50	58	57			Do.
July 21	99	99	58	122	58	58	58			Cloudy.
July 22	62	103	50	123	50	50	50			Clear.
July 23	103			124	60					Light rain at night.
July 24	62	106	59	123	57	60	50			Clear.
July 25	62	105	50	123	56	60	50			Do.
July 26	76	94	50	120	58	60	50			Do.
July 27	60	93		110	56	58				Do.
July 28	64	92	50	109	55	57	56			Do.
July 29	96	96	57	119		58	57			Do.
July 30	54	95	58	118	54	58	58			Do.
July 31	56	92		112	56	59				Do.
Aug. 1	55	92	74	110	56	59	57		W.	Do.
Aug. 2	51	92	75	114	59	59	57		S.	Do.
Aug. 3	51	92	78	115	55	58	57		W.	Do.
Aug. 4	50	87	79	110	54	58	58		S.	Do.
Aug. 5	50	87	75	109	54	57	50		S.	Do.
Aug. 6	51	96	74	120	54	58	57		C.	Do.
Aug. 7	55	98	70	118	54	58	58		S. W.	Do.
Aug. 8	55	95	77	120	54	58	58		S.	Do.
Aug. 9	57	95	78	115	54	59	57		W.	Do.
Aug. 10	53	93	75	114	54	58	57		N.E.	Do.
Aug. 11	54	90	75	112	54	58	56		S.E.	Do.
Aug. 12	50	90	73	112	53	58	57		S.	Do.
Aug. 13	45	93	72	116	52	57	57		W.	Do.
Aug. 14	49	94	75	112	52	58	50		S.	Do.
Aug. 15	54	96	80	117	52	58	57		S. W.	Do.
Aug. 16	55	97	77	114	53	58	58		C.	Do.
Aug. 17	51	88	75	102	52	56	58		C.	Cloudy 5 p. m.
Aug. 18	49	93	71	112	52	57	57		C.	Cloudy a. m.
Aug. 19	49	97	75	119	52	58	57		W.	Do.
Aug. 20	55	101	76	118	54	59	58		W.	Do.
Aug. 21	54	97	75	117	53	58	57		C.	Do.
Aug. 22	50	95	72	114	53	60	58		C.	Do.
Aug. 23	54	86	74	104	53	58	57		S. W.	Do.
Aug. 24	54	85	75	106	52	58	57		S. W.	Do.
Aug. 25	50	85	58	105	50	56	55		S.	Cloudy p. m.
Aug. 26	60	90	72	107	51	56	55		N.	Clear.
Aug. 27	54	93	74	114	52	58	54		C.	Do.
Aug. 28	50	79	75	96	52	55	55		N.	Do.
Aug. 29	40	75	62	94	51	54	62		C.	Cloudy a. m.
Aug. 30	45	83	64	102	50	54	53		C.	Clear.
Aug. 31	46	84	64	100	50	54	54		S.	Do.
Sept. 1	50	95	65	118	50	56	55	40	W.	Do.
Sept. 2	50	90	69	120	50	56	55	50	N.	Do.
Sept. 3	55	99	74	130	52	58	56	54	N.	Do.
Sept. 4	52	100	72	120	52	58	57	52	N.	Do.
Sept. 5	55	98	75	118	54	58	57	50	N.	Do.
Sept. 6	43	97	72	116	53	58	50	40	S.	Do.
Sept. 7	50	90	70	104	52	57	49	49	N.	Do.
Sept. 8	46	94	67	100	52	57	45	45	E.	Do.
Sept. 9	48	94	74	104	52	50	47	47	N.	Do.
Sept. 10	50	97	73	112	52	57	49	49	C.	Do.
Sept. 11	49	97	70	108	52	57	48	48	C.	Do.
Sept. 12	40	93	72	99	52	57	45	45	S. E.	Cloudy.
Sept. 13	48	88	68	98	52	57	47	47	S. E.	Clear.
Sept. 14	50	91	68	108	53	50	40	40	N. E.	Do.
Sept. 15	51	95	69	110	52	50	55	50	C.	Do.
Sept. 16	50	89	65	99	52	50	49	49	S. E.	Cloudy.
Sept. 17	45	81	63	90	52	56	44	44	C.	Do.
Sept. 18	57	96	62	112	51	55	44	44	S.	Clear.
Sept. 19	45	86	64	116	51	56	44	44	C.	Do.
Sept. 20	44	85	64	100	50	54	43	43	E.	Do.
Sept. 21	43	85	63	100	50	54	42	42	S. E.	Do.
Sept. 22	46	78	62	93	50	54	44	44	C.	Cloudy.
Sept. 23	39	70	58	100	48	53	42	42	S.	Clear.
Sept. 24	54	78	58	110	49	58	44	44	N.	Do.
Sept. 25	41	85	63	110	48	54	39	39	N. E.	Do.
Sept. 26	41	88	62	114	48	58	40	40	C.	Do.
Sept. 27	39	82	62	110	47	52	38	38	N. E.	Cloudy.
Sept. 28	39	84	61	94	47	52	38	38	S.	Do.
Sept. 29	42	75	61	.....	47	52	38	38	C.	Do.
Sept. 30	45	68	65	.....	48	52	38	38	C.	Do.

TABLE II.—Record of salmon-seining operations conducted at United States salmon-breeding establishment on the McCloud River, California, from July 2, 1880, to September 18, 1880, inclusive, on account of the United States Fish Commission, by Livingston Stone.

Date.	Hour.	Temperature of—		Direction of wind.	Condition of sky.	Seine hauled (length).	Fish taken.		Ripe fish.	
		Air.	Water.				Males.	Females.	Males.	Females.
July 2	4.30 p. m.	o	58		Clear	65	143	7	None.	None.
July 2	6.00 p. m.		55		do.	65	8		None.	None.
July 4	4.00 p. m.		58		do.	65	10	2	None.	None.
July 6	5.00 p. m.		57		do.	65	2		None.	None.
July 6	6.00 p. m.		57		do.	65	6		None.	None.
July 6	7.30 p. m.		57		do.	65	40	4	None.	None.
July 8	8.00 p. m.		57		do.	65	12	3	None.	None.
July 8	7.00 p. m.		57		do.	65	20	3	None.	None.
July 9	5.30 a. m.		58		do.	65	40	3	None.	None.
July 9	6.00 a. m.		58		do.	65	3		None.	None.
July 9	7.00 a. m.		58		do.	65	1		None.	None.
July 9	7.00 p. m.		58		do.	65	20	3	None.	None.
July 10	7.00 a. m.		55		do.	65	3	1	None.	None.
July 10	7.00 p. m.		58		do.	65	40	3	None.	None.
July 12	7.00 p. m.		58		do.	65	3	1	None.	None.
July 13	7.00 p. m.		58		do.	65	20	3	None.	None.
July 14	7.00 p. m.		57		do.	65	17	3	None.	None.
July 15	7.00 p. m.		57		do.	150	40	0	None.	None.
July 15	7.30 p. m.		57		do.	150	700	62	None.	None.
July 18	7.30 p. m.		58		do.	150	70	3	None.	None.
July 18	7.30 p. m.		58		do.	150	40	1	None.	None.
July 19	7.30 p. m.		58		do.	150	70	4	None.	None.
July 23	7.00 p. m.		59		do.	150	100	2	None.	None.
July 23	7.30 p. m.		58		do.	150	400	25	None.	None.
July 26	6.00 p. m.		58		do.	150	18	2	None.	None.
July 30	6.30 p. m.		57		do.	150	20		None.	None.
July 31	7.00 p. m.		58		do.	150	70	0	None.	None.
Aug. 1	7.30 p. m.		57		do.	150	20		None.	None.
Aug. 2	7.00 p. m.		56		do.	150	30	3	None.	None.
Aug. 3	7.30 p. m.		57		do.	150	50	3	None.	None.
Aug. 4	7.00 p. m.		56		do.	150	70	5	None.	None.
Aug. 4	7.30 p. m.		56		do.	150	50	2	None.	None.
Aug. 5	7.00 p. m.		57		do.	150	80		None.	None.
Aug. 5	7.30 p. m.		57		do.	150	9	0	None.	None.
Aug. 9	7.30 p. m.		58		do.	150	640	60		13
Aug. 28	7.25 p. m.	54	60		do.	150	450	50	(*)	3
Aug. 28	8.30 p. m.	54	60		do.	150	134	10	(*)	2
Aug. 28	9.30 p. m.	51	60		do.	150	130	20	(*)	3
Aug. 28	10.10 p. m.	51	60		do.	150	115	10	(*)	1
Aug. 28	11.00 p. m.	47	60		do.	150	85	15	(*)	7
Aug. 28	11.45 p. m.	46	60		do.	150	720	80	(*)	8
Aug. 30	6.30 p. m.				do.	150	270	30	(*)	11
Aug. 30	6.30 p. m.				do.	150	200	40	(*)	5
Aug. 30	7.15 p. m.				do.	150	180	20	(*)	
Aug. 30	8.00 p. m.				do.	150	90	10	(*)	
Aug. 30	8.45 p. m.				do.	150	90	10	(*)	
Aug. 31	9.45 p. m.				do.	150	18	2	(†)	1
Aug. 31	4.00 a. m.				do.	150	70	10	(†)	2
Aug. 31	4.45 a. m.				do.	150	72	8	(†)	2
Aug. 31	5.45 a. m.				do.	150	12	6	(†)	4
Aug. 31	6.15 a. m.				do.	150	14	6	(†)	
Aug. 31	7.00 a. m.				do.	150	13	2	(†)	2
Aug. 31	8.15 a. m.	65		N.	do.	150	10	2	(†)	5
Aug. 31	8.45 a. m.	70		N.	do.	150	52	5	(†)	4
Aug. 31	10.15 a. m.	75		N.	do.	150	374	22	(†)	4
Aug. 31	5.30 p. m.	70	56	Calm.	do.	150	10		(†)	
Aug. 31	7.30 p. m.	60	55	Calm.	do.	150	125	25	(†)	
Aug. 31	8.00 p. m.	60	53	Calm.	do.	150	05	10	(†)	
Aug. 31	8.45 p. m.			N.	do.	150	50	10	(†)	7
Sept. 1	9.45 p. m.			N.	do.	150	267	33	(†)	3
Sept. 1	5.00 a. m.			N.	do.	150	185	15	(†)	1
Sept. 1	5.45 a. m.			N.	do.	150	54	6	(†)	7
Sept. 1	6.30 a. m.			N.	do.	150	28	2	(†)	4
Sept. 1	8.15 a. m.			N.	do.	150	267	33	(†)	9
Sept. 1	5.30 p. m.			Calm.	do.	150	230	10	(†)	4
Sept. 1	6.00 p. m.			Calm.	do.	150	283	17	(†)	9
Sept. 1	6.30 p. m.			Calm.	do.	150	824	16	(†)	12
Sept. 1	7.00 p. m.			Calm.	do.	150	206	9	(†)	7
Sept. 1	8.30 p. m.			Calm.	do.	150	144	6	(†)	4
Sept. 1	0.00 p. m.			Calm.	do.	150	39	9	(†)	6
Sept. 1	9.50 p. m.			Calm.	do.	150	270	80	(†)	7
Sept. 2	4.45 a. m.			N.	do.	150	270	80	(†)	
Sept. 2	5.30 a. m.			N.	do.	150	230	20	(†)	

\* A few ripe males.

† Ripe males more numerous.

‡ Not counted, but usually much more numerous than the females.

TABLE II.—Record of salmon-seining operations, &c.—Continued

Date.	Hour.	Temperature of—		Direction of wind.	Condition of sky.	Seine hauled (length).	Fish taken.		Ripe fish.	
		Air.	Water.				Males.	Females.	Males.	Females.
		°	°			Feet.				
Sept. 2	6.00 a. m.			N.	Clear	150	225	25		
Sept. 2	6.30 a. m.			N.	do	150	230	20		6
Sept. 2	7.30 a. m.			N.	do	150	85	15		7
Sept. 2	9.00 a. m.			N.	do	150	275	25		5
Sept. 2	6.00 p. m.			O.	do	150	139	11		4
Sept. 2	6.15 p. m.			O.	do	150	110	18		2
Sept. 2	6.30 p. m.			C.	do	150	116	7		2
Sept. 2	7.30 p. m.			C.	do	150	244	81		11
Sept. 2	8.13 p. m.			C.	do	150	183	17		2
Sept. 2	8.45 p. m.			C.	do	150	112	18		3
Sept. 2	9.15 p. m.			C.	do	150	90	10		1
Sept. 3	4.45 a. m.			N.	do	150	185	15		5
Sept. 3	5.20 a. m.			N.	do	150	850	50		21
Sept. 3	5.45 a. m.			N.	do	150	180	20		6
Sept. 3	6.30 a. m.			N.	do	150	180	20		4
Sept. 3	8.00 a. m.			N.	do	150	178	20		7
Sept. 3	9.35 a. m.			N.	do	150	264	25		11
Sept. 3	9.50 a. m.			N.	do	150	43	5		2
Sept. 3	5.30 p. m.			Calh.	do	150	53	7		4
Sept. 3	6.00 p. m.			Calh.	do	150	12	8		4
Sept. 3	6.30 p. m.			Calh.	do	150	30	5		8
Sept. 3	7.00 p. m.			Calh.	do	150	26	10		
Sept. 3	7.30 p. m.			Calh.	do	150	210	40		4
Sept. 3	8.00 p. m.			Calh.	do	150	180	25		9
Sept. 3	9.15 p. m.			Calh.	do	150	123	20		5
Sept. 3	10.00 p. m.			Calh.	do	150	100	8		7
Sept. 4	5.20 a. m.			Calh.	do	150	163	37		2
Sept. 4	6.00 a. m.			Calh.	do	150	123	27		12
Sept. 4	6.30 a. m.			Calh.	do	150	106	32		7
Sept. 4	7.00 a. m.			Calh.	do	150	11	7		2
Sept. 4	9.30 a. m.			N.	do	150	19	8		8
Sept. 4	5.45 p. m.	78	58	C.	do	150	180	20		11
Sept. 4	6.15 p. m.	69	58	C.	do	150	350	50		12
Sept. 4	7.00 p. m.	68	58	C.	do	150	850	50		17
Sept. 4	8.45 p. m.	65	58	C.	do	150	170	25		5
Sept. 4	9.15 p. m.	64	58	C.	do	150	230	15		5
Sept. 5	4.45 a. m.	52	52	C.	do	150	175	20		5
Sept. 5	5.10 a. m.	52	52	C.	do	150	107	30		13
Sept. 5	5.35 a. m.	52	52	C.	do	150	122	35		10
Sept. 5	7.00 a. m.	52	52	C.	do	150	258	42		17
Sept. 5	7.15 a. m.	67	52	C.	do	150	200	50		19
Sept. 5	9.45 a. m.	87	55	N.	do	150	20			
Sept. 5	10.10 a. m.	87	55	N.	do	150	180	20	(†)	1
Sept. 5	5.30 p. m.	38	58	N.	do	150	350	50	(†)	11
Sept. 5	6.00 p. m.	30	58	N.	do	150	175	25	(†)	5
Sept. 5	6.30 p. m.	78	57	N.	do	150	86	3	(†)	1
Sept. 5	7.00 p. m.	69	57	N.	do	150	229	50	(†)	19
Sept. 5	9.00 p. m.	68	56	N.	do	150	222	25	(†)	8
Sept. 5	9.30 p. m.	67	56	N.	do	150	181	8	(†)	4
Sept. 6	4.45 a. m.	52	56	N.	do	150	181	44	(†)	14
Sept. 6	5.10 a. m.	52		N.	do	150	36	14	(†)	4
Sept. 6	5.30 a. m.	50		N.	do	150	90	52	(†)	12
Sept. 6	6.30 a. m.	51		N.	do	150	84	5	(†)	1
Sept. 6	7.00 a. m.	61	54	N.	do	150	180	10	(†)	10
Sept. 6	9.00 a. m.	74	58	C.	do	150	76	25	(†)	10
Sept. 6	10.00 a. m.	77	60	C.	do	150	95	80	(†)	12
Sept. 6	5.45 p. m.	78	57	C.	do	150	630	70	(†)	38
Sept. 6	6.15 p. m.	66		C.	do	150	480	70	(†)	20
Sept. 6	8.10 p. m.	64	56	C.	do	150	818	82	(†)	21
Sept. 6	9.00 p. m.	62	56	C.	do	150	293	7	(†)	5
Sept. 7	4.30 a. m.	55	52	N.	do	150	360	40	(†)	12
Sept. 7	5.15 a. m.	53	52	N.	do	150	200	40	(†)	16
Sept. 7	5.45 a. m.	53	54	N.	do	150	215	85	(†)	16
Sept. 7	6.15 a. m.	53	54	N.	do	150	175	25	(†)	10
Sept. 7	7.45 a. m.	54	55	N.	do	150	150	50	(†)	21
Sept. 7	9.35 a. m.	81	55	N.	do	150	139	17	(†)	8
Sept. 7	10.15 a. m.	85	56	N.	do	150	117	28	(†)	11
Sept. 7	5.40 p. m.	70	58	N.	do	150	867	33	(†)	13
Sept. 7	6.00 p. m.	65	58	C.	do	150	250	50	(†)	19
Sept. 7	6.30 p. m.	65	58	C.	do	150	280	40	(†)	15
Sept. 7	7.30 p. m.	64	58	C.	do	150	200	40	(†)	12
Sept. 7	8.00 p. m.	64	58	C.	do	150	175	25	(†)	6
Sept. 7	9.00 p. m.	62	58	C.	do	150	180	20	(†)	7

\* Not counted but usually much more numerous than the females.  
 † Not counted, but numerous.

TABLE II. — Record of salmon-seining operations—Continued.

Date.	Hour.	Temperature of—		Direction of wind.	Condition of sky.	Seine hauled (length).	Fish taken.		Ripe fish.		
		Air.	Water.				Males.	Females.	Males.	Females.	
Sept. 8	4.00 a. m.	48	58	C.	Clear	150	175	28			14
Sept. 8	4.30 a. m.	48	54	C.	do	150	265	35			26
Sept. 8	5.25 a. m.	48	54	C.	do	150	180	20			12
Sept. 8	6.00 a. m.	48	54	C.	do	180	88	12			6
Sept. 8	6.30 a. m.	58	54	C.	do	150	80	20			9
Sept. 8	9.40 a. m.	80	54	C.	do	150	100	15			8
Sept. 8	10.30 a. m.	80	56	C.	do	150	188	12			6
Sept. 8	5.50 p. m.	70	56	C.	do	150	380	20			12
Sept. 8	6.05 p. m.	62	56	C.	do	150	110	15			6
Sept. 8	6.50 p. m.	58	56	C.	do	150	128	12			6
Sept. 8	7.30 p. m.	56	56	C.	do	150	130	20			10
Sept. 8	8.50 p. m.	56	54	C.	do	150	165	15			7
Sept. 8	9.30 p. m.	54	54	C.	do	150	88	12			6
Sept. 9	4.30 a. m.	53	54	N	do	150	160	40			7
Sept. 9	5.15 a. m.	53	54	N	do	150	100	40			14
Sept. 9	6.00 a. m.	53	54	N	do	160	35	15			5
Sept. 9	6.30 a. m.	53	54	N	do	150	340	60			30
Sept. 9	8.00 a. m.	74	54	N	do	150	250	50			13
Sept. 9	8.30 a. m.	76	54	N	do	150	250	50			15
Sept. 9	10.15 a. m.	85	55	N	do	150	850	50			16
Sept. 9	11.00 a. m.	90	55	N	do	150	55	5			2
Sept. 9	5.50 p. m.	78	56	N	do	150	270	30			15
Sept. 9	6.10 p. m.	65	56	C.	do	150	270	30			11
Sept. 9	6.25 p. m.	65	56	C.	do	150	50	10			2
Sept. 9	7.15 p. m.	65	56	C.	do	150	80	20			2
Sept. 9	8.15 p. m.	60	56	C.	do	150	60	15			7
Sept. 9	9.00 p. m.	60	56	C.	do	150	125	25			6
Sept. 9	9.35 p. m.	60	56	C.	do	150	230	20			8
Sept. 10	5.15 a. m.	48	52	N	do	150	175	25			12
Sept. 10	5.55 a. m.	48	52	N	do	150	113	12			6
Sept. 10	6.25 a. m.	50	52	N	do	150	12	3			1
Sept. 10	6.55 a. m.	50	52	C.	do	150	270	30			24
Sept. 10	8.50 a. m.	66	52	C.	do	150	185	15			7
Sept. 10	9.10 a. m.	66	54	N	do	150	180	20			11
Sept. 10	11.05 a. m.	84	54	N	do	150	20	25			18
Sept. 10	11.25 a. m.	84	56	N	do	160	154	30			10
Sept. 10	5.30 p. m.	77	56	C.	do	150	250	50			9
Sept. 10	6.00 p. m.	77	56	C.	do	150	220	30			10
Sept. 10	6.40 p. m.	70	56	C.	do	150	125	25			6
Sept. 10	7.00 p. m.	64	56	C.	do	150	125	25			8
Sept. 10	7.35 p. m.	64	56	C.	do	150	140	10			5
Sept. 10	8.10 p. m.	64	56	C.	do	150	85	6			8
Sept. 10	9.00 p. m.	58	56	C.	do	150	99	6			6
Sept. 10	9.45 p. m.	56	54	C.	do	150	90	10			2
Sept. 10	10.10 p. m.	58	54	C.	do	150	45	6			1
Sept. 10	11.30 p. m.	54	54	C.	do	150	22	3			40
Sept. 11	8.30 a. m.	76	54	N	do	150	450	50			7
Sept. 11	8.65 a. m.	76	54	N	do	150	138	12			8
Sept. 11	9.45 a. m.	79	54	N	do	150	135	15			4
Sept. 11	11.00 a. m.	86	56	N	do	150	117	8			8
Sept. 11	5.65 p. m.	76	56	N	do	150	175	25			18
Sept. 11	6.15 p. m.	76	56	N	do	150	70	6			8
Sept. 11	7.00 p. m.	62	56	C.	do	150	85	15			10
Sept. 11	8.00 p. m.	60	56	C.	do	150	80	20			11
Sept. 11	8.45 p. m.	60	56	C.	do	150	80	20			7
Sept. 12	6.20 a. m.	48	52	C.	do	150	215	35			28
Sept. 12	6.45 a. m.	48	52	C.	do	150	176	16			9
Sept. 12	8.35 a. m.	64	53	C.	do	150	865	45			30
Sept. 12	10.25 a. m.	82	53	C.	do	150	270	30			28
Sept. 12	5.45 p. m.	80	54	W.	do	150	180	20			12
Sept. 12	6.05 p. m.	76	54	W.	do	150	140	10			5
Sept. 12	6.45 p. m.	64	54	W.	do	150	90	10			6
Sept. 12	7.15 p. m.	64	54	C.	do	150	100	50			22
Sept. 12	8.40 p. m.	62	54	C.	do	150	96	12			8
Sept. 12	9.10 p. m.	60	54	C.	do	150	85	15			9
Sept. 13	6.00 a. m.	50	52	N	do	150	285	35			28
Sept. 13	6.40 a. m.	50	52	N	do	150	460	50			46
Sept. 13	8.30 a. m.	58	52	C.	do	150	270	30			27
Sept. 13	10.20 a. m.	78	54	C.	do	150	185	16			10
Sept. 13	11.00 a. m.	78	54	C.	do	160	85	15			12
Sept. 13	6.05 p. m.	72	54	C.	do	150	135	15			12
Sept. 13	6.40 p. m.	60	54	C.	do	160	88	12			9
Sept. 13	7.30 p. m.	58	54	C.	do	160	170	30			25
Sept. 13	9.15 p. m.	58	54	C.	do	160	550	50			34
Sept. 14	6.25 a. m.	52	52	N	do	150	275	25			20

\* Almost all ripe.



TABLE II.—Record of salmon-seining operations, &c.—Continued

Date.	Hour.	Temperature of—		Direction of wind.	Condition of sky.	Seine hauled (length).	Fish taken.		Ripe fish.	
		Air.	Water.				Males.	Females.	Males.	Females.
		°	°			Feet.				
Sept. 14 .....	6.50 a. m.	52	52	N.	Clear .....	150	185	15	(-)	12
Sept. 14 .....	8.25 a. m.	74	52	C.	do .....	160	270	80	(-)	28
Sept. 14 .....	8.45 a. m.	76	52	C.	do .....	100	265	85	(-)	27
Sept. 14 .....	10.20 a. m.	80	54	C.	do .....	150	142	8	(-)	6
Sept. 17 .....	9.00 a. m.	68	54	C.	do .....	150	825	175	(-)	167
Sept. 17 .....	5.30 p. m.	80	56	C.	do .....	150	350	50	(-)	40
Sept. 17 .....	9.15 p. m.	60	52	E.	do .....	150	425	75	(-)	68
Sept. 18 .....	9.30 a. m.	68	52	E.	do .....	150	860	140	(-)	85
Sept. 18 .....	2.15 p. m.	80	54	E.	do .....	150	420	80	(-)	50

\* Almost all ripe.

Eggs OBTAINED.—As the eggs are not taken from the spawning salmon as they are caught in the seine, but as all the ripe fish of the whole day's catch are put together and the eggs taken from the whole the next day, it is not known how many eggs are obtained from each separate haul of the seine.

TABLE III.—Table showing the daily number of salmon eggs taken at the United States salmon-hatching station on the McCloud River, California, during the season of 1880.

Date.	No. of eggs.	No. of females spawned.	Date.	No. of eggs.	No. of females spawned.
August 31 .....	156, 600	88	August 11 .....	270, 000	84
August 1 .....	286, 800	70	August 12 .....	570, 000	171
August 2 .....	192, 600	58	August 13 .....	519, 000	167
August 3 .....	858, 800	98	August 14 .....	403, 200	126
August 4 .....	856, 400	89	August 15 .....		
August 5 .....	420, 000	107	August 16 .....		
August 6 .....	532, 200	137	August 17 .....	291, 000	92
August 7 .....	408, 800	117	August 18 .....	909, 600	291
August 8 .....	513, 000	141	August 19 .....	286, 800	89
August 9 .....	886, 400	115			
August 10 .....	540, 000	159	Total .....	7, 896, 800	2, 164

TABLE IV.—Table of distribution of salmon-eggs from the United States salmon-breeding station, McCloud River, California, during the season of 1880.

State.	Commissioner.	No. asked.	No. assigned.	No. forwarded.	Destination.
Illinois .....	N. K. Fairbank .....	200, 000	100, 000	100, 000	Geneva Lake, Wis.
Kansas .....	D. B. Long .....	100, 000	100, 000	100, 000	D. B. Long, Ellsworth, Kans.
Maryland .....	T. B. Ferguson .....	800, 000	200, 000	200, 000	Oakland, Md., Garret County.
Maryland .....	Thomas Hughtlett .....	200, 000	250, 000	200, 000	Druid Hill Park, Baltimore, Md.
Missouri .....	Silas Woodson .....	200, 000	200, 000	200, 000	Silas Woodson, Saint Joseph, Mo.
Missouri .....	J. Ed. Humes .....	5, 000	10, 000	10, 000	J. E. Humes, Versailles, Morgan County, Mo.
Minnesota .....	R. O. Sweeney .....	200, 000	200, 000	200, 000	R. O. Sweeney, Saint Paul.
Nebraska .....	R. R. Livingston .....	750, 000	400, 000	400, 000	"Nebraska Fish Commission," South Bend, Cass County, Nebr.
New York .....	James Amlon, jr. ....	10, 000			Mrs. J. H. Slack, Bloomsbury, N. J.
New Jersey .....	E. J. Anderson .....	800, 000	800, 000	800, 000	James Annin, jr., Caledonia, N. Y.
North Carolina .....	S. G. Wortle .....	200, 000	200, 000	200, 000	S. G. Worth, Morgantown, N. C.
South Carolina .....	A. P. Butler .....	200, 000	200, 000	200, 000	Do.

TABLE IV.—Table of distribution of salmon-eggs, &amp;c.—Continued.

State.	Commissioner.	No. asked.	No. assigned.	No. forwarded.	Destination.
West Virginia.	H. B. Miller .....	150,000	150,000	150,000	C. S. White, Romney, W. Va., care agent, Green Spring Run.
Canada .....	S. Wilmot .....	50,000	50,000	50,000	S. Wilmot, Newcastle, Ont.
France .....	R. Wattel .....	100,000	100,000	100,000	Fred Mather, for Societé d'Acclimation, Paris.
Germany .....	Von Behr .....	800,000	800,000	800,000	Fred Mather, for Deutsche Fischerei-Verein, Berlin.
Germany .....	F. Busse .....	50,000	50,000	50,000	Fred Mather, hatching ponds, Bremen.
Germany .....	Carl Schuster .....	20,000	20,000	20,000	Fred Mather, hatching ponds, Freiburg.
Holland .....	Von Pestal .....	100,000	100,000	100,000	Fred Mather, Government of the Netherland, in charge of Zoological Society of Amsterdam.
Holland .....	C. J. Bottemann ..	100,000	100,000	100,000	Fred Mather, hatching ponds, Bergen-op-zoom.
U. S. ....	.....	.....	810,000	810,000	William P. Sauerhoff, for Upper Potomac River.
			8,800,000	8,800,000	

TABLE V.—Disposition of California salmon reared from eggs collected in 1878.

States.	Where finally hatched.	Waters stocked.	Tributaries in which fish were placed.	Locality.	Date of transfer.	Number of fish.
California.....	United States hatchery.....	Sacramento River.....	McCloud and Little Sacramento Rivers.	McCloud and Sacramento, Cal.....	Nov.—, 1878	2,000,000
Illinois.....	Geneva Lake hatching-house	Fox River.....	Geneva Lake.....	Geneva, Wis.....	Nov.—, 1879	200,000
	do.....	Fox River.....	Crystal Lake.....	Crystal Lake, Ill.....	Nov.—, 1879	20,000
	do.....	Illinois River.....	Rock River.....	Rockford, Ill.....	Nov.—, 1879	50,000
Iowa.....	do.....	Illinois River.....	Fox River.....	Cacy, Ill.....	Nov.—, 1879	20,000
	Anamosa, Iowa.....	Missouri River.....	Sioux River.....		Jan. 27, 1879	4,000
do.....	do.....	Mississippi River.....	Mud Lake.....		Jan. 31, 1879	10,000
do.....	do.....	Mississippi River.....	Skunk River.....		Jan. 31, 1879	10,000
do.....	do.....	Mississippi River.....	Wall Lake.....		Jan. 31, 1879	10,000
do.....	do.....	Mississippi River.....	Towner's Lake.....		Jan. 31, 1879	7,000
do.....	do.....	Mississippi River.....	Iowa River.....		Jan. 31, 1879	7,000
do.....	do.....	Mississippi River.....	Des Moines River.....		Feb. 12, 1879	10,000
do.....	do.....	Mississippi River.....	East Coon River.....		Feb. 12, 1879	10,000
do.....	do.....	Mississippi River.....	Middle River.....		Feb. 12, 1879	10,000
do.....	do.....	Mississippi River.....	Wall Lake.....		Feb. 12, 1879	20,000
do.....	do.....	Mississippi River.....	Maple River.....		Feb. 12, 1879	10,000
do.....	do.....	Mississippi River.....	Magnoketa River.....		Feb. 20, 1879	10,000
do.....	do.....	Mississippi River.....	Turkey River.....		Mar. 20, 1879	3,000
do.....	do.....	Mississippi River.....	Liaborn River.....		Mar. 24, 1879	4,000
do.....	do.....	Mississippi River.....	Wapsee River.....		Mar. 10, 1879	10,000
do.....	do.....	Mississippi River.....	Big Rock River.....		Mar. 17, 1879	3,000
do.....	do.....	Mississippi River.....	Boone River.....		Mar. 22, 1879	10,000
do.....	do.....	Mississippi River.....	Upper Des Moines River.....		Mar. 22, 1879	10,000
do.....	do.....	Missouri River.....	Plymouth River.....		Mar. 22, 1879	15,000
do.....	do.....	Mississippi River.....	Cedar River.....		Mar. 28, 1879	5,000
do.....	do.....	Mississippi River.....	East Skunk River.....		April 1, 1879	2,500
do.....	do.....	Mississippi River.....	West Skunk River.....		April 1, 1879	2,500
do.....	do.....	Mississippi River.....	Malty Kellogg.....		May 14, 1879	2,500
do.....	do.....	Mississippi River.....	Streams along C. B. & Q. R. R.....		May 19, 1879	12,000
do.....	do.....	Mississippi River.....	Independence River.....		May 20, 1879	4,000
do.....	do.....	Mississippi River.....	Volga River.....		May 20, 1879	5,000
do.....	do.....	Mississippi River.....	Turkey River.....		May 20, 1879	5,000
do.....	do.....	Mississippi River.....	Cedar River.....		May 20, 1879	10,000
do.....	do.....	Mississippi River.....	Spring Branch.....		May 20, 1879	5,000
Kansas.....	Cedar Rapids, Iowa.....	Missouri River.....	Stranger River.....	Stranger, Kans.....	May —, 1879	2,500
	do.....	Mississippi River.....	Verdun River.....	Independence, Kans.....	May —, 1879	2,500
	do.....	Missouri River.....	Delaware River.....	Delaware, Kans.....	May —, 1879	3,000
	do.....	Kansas River.....	Red Vermillion River.....	Centralia, Kans.....	May —, 1879	2,000
	do.....	Kansas River.....	Spring Creek.....	Wetmore, Kans.....	May —, 1879	1,000
	do.....	Big Blue River.....	Mill Creek.....	Washington, Kans.....	May —, 1879	1,000
	do.....	do.....	Big Blue River.....	Black Vermillion.....	Frankfort, Kans.....	May —, 1879

[11] SALMON-HATCHING STATION ON M'CLOUD RIVER, CAL. 607

TABLE V.—Disposition of California salmon reared from eggs collected in 1878—Continued.

Date.	Where finally hatched.	Where stocked.	Tributaries in which fish were placed.	Locality.	Date of transfer.	Number of fish.
Kansas .....	Cedar Rapids, Iowa.....	Kansas River.....	Clear Creek.....	Barrett, Kans.....	May —, 1879	1,000
.....do.....	.....do.....	Kansas River.....	Big Blue River.....	Blue Rapids, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Big Blue River.....	Little Blue River.....	Waterville, Kans.....	May —, 1879	2,000
.....do.....	.....do.....	Kansas River.....	Republican River.....	Concordia, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Kansas River.....	Solomon River.....	Bloft, Kans.....	May —, 1879	1,000
.....do.....	.....do.....	Kansas River.....	Soldier River.....	Topeka, Kans.....	May —, 1879	1,000
.....do.....	.....do.....	Kansas River.....	Silver Lake.....	Silver Lake, Kans.....	May —, 1879	500
.....do.....	.....do.....	Kansas River.....	Vermillion River.....	Wamego, Kans.....	May —, 1879	2,500
.....do.....	.....do.....	Kansas River.....	Big Blue River.....	Manhattan, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Kansas River.....	Republican River.....	Junction City, Kans.....	May —, 1879	3,000
.....do.....	.....do.....	Kansas River.....	Chapman's Creek.....	Chapman's Creek, Kans.....	May —, 1879	2,000
.....do.....	.....do.....	Kansas River.....	Solomon River.....	Solomon City, Kans.....	May —, 1879	2,000
.....do.....	.....do.....	Smoky Hill River.....	Saline River.....	Saline, Kans.....	May —, 1879	3,000
.....do.....	.....do.....	Smoky Hill River.....	Spring Creek.....	Brookville, Kans.....	May —, 1879	1,000
.....do.....	.....do.....	Kansas River.....	Smoky Hill River.....	Edgworth, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Smoky Hill River.....	Big Creek.....	Hayes City, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Smoky Hill River.....	Big Creek.....	Ellis, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Kansas River.....	Wakasa River.....	Ottawa, Kans (!).....	May —, 1879	2,000
.....do.....	.....do.....	Missouri River.....	Osage River (!).....	Redding, Kans.....	May —, 1879	2,000
.....do.....	.....do.....	Arkansas River.....	Neosho River.....	Emporia, Kans.....	May —, 1879	5,000
.....do.....	.....do.....	Neosho River.....	Cottonwood River.....	Florence, Kans.....	May —, 1879	2,000
.....do.....	.....do.....	Arkansas River.....	Walnut River.....	Eldorado, Kans.....	May —, 1879	3,000
.....do.....	.....do.....	Arkansas River.....	Little Arkansas River.....	Halstead, Kans.....	May —, 1879	2,500
.....do.....	.....do.....	Little Arkansas River.....	Lake Inman.....	McPherson, Kans.....	May —, 1879	2,000
.....do.....	.....do.....	Arkansas River.....	Cow Creek.....	Hutchinson, Kans.....	May —, 1879	3,000
.....do.....	.....do.....	Arkansas River.....	Walnut River.....	Great Bend, Kans.....	May —, 1879	3,000
.....do.....	.....do.....	Arkansas River.....	Pawnee Creek.....	Larned, Kans.....	May —, 1879	5,000
Maine .....	Pembroke hatching-house.....	Saint Croix River.....	Koen's Lake Stream.....	Keen's Lake, Me.....	Feb. 6, 1879	9,700
.....do.....	.....do.....	Bay of Fundy.....	Penmaqun River.....	Pembroke, Me.....	Feb. 13, 1879	10,000
Maryland.....	Druid Hill hatching-house.....	Bush River.....	Winter's Run.....	Wina, Md.....	Feb. 1, 1879	4,000
.....do.....	.....do.....	Chesapeake Bay.....	Patuxent River.....	Savage Station, Md.....	Feb. 1, 1879	10,000
.....do.....	.....do.....	Chesapeake Bay.....	Chesetr River.....	Millington, Md.....	Feb. 13, 1879	12,000
.....do.....	.....do.....	Chesapeake Bay.....	Choptank River.....	Henderson, Md.....	Feb. 21, 1879	8,000
.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	Feb. 24, 1879	7,000
.....do.....	.....do.....	Tungier Sound.....	Black Water.....	Cambridge, Md.....	Feb. 28, 1879	3,000
.....do.....	.....do.....	Transquaking River.....	Chickacomco.....	.....do.....	Feb. 28, 1879	3,000
.....do.....	.....do.....	Tungier Sound.....	Transquaking River.....	Airey's Station.....	Feb. 28, 1879	3,000
.....do.....	.....do.....	Chesapeake Bay.....	Patapsco and Patuxent Rivers.....	Hood's Mill and Airey, Md.....	Feb. 28, 1879	12,000
.....do.....	.....do.....	.....do.....	.....do.....	.....do.....	June 6, 1879	236
Michigan.....	.....do.....	Lake Michigan.....	Paw Paw River.....	Barrien County, Mich.....	Jan. 8, 1879	25,000
.....do.....	.....do.....	Dowagiac River.....	Ropkagon Creek.....	Cass County, Mich.....	Jan. 9, 1879	10,000
.....do.....	.....do.....	Dowagiac River.....	Peceanic River.....	Cass County, Mich.....	Jan. 10, 1879	5,000

		Pine Lake .....	Dowagiac River .....	Van Buren County, Mich .....	Jan. 10, 1879	10,000
		Saint Joseph River .....	Walron Creek .....	Saint Joseph County, Mich .....	Jan. 23, 1879	10,000
		Saint Joseph River .....	Fate's Creek .....	Saint Joseph County, Mich .....	Jan. 23, 1879	10,000
		Lake Michigan .....	Grand River .....	Jackson, Mich .....	Jan. 30, 1879	30,000
		Lake Michigan .....	Manistee River .....	Wexford County, Mich .....	Feb. 6, 1879	25,000
		Lake Erie .....	Raisin River .....	Monroe, Mich .....	Feb. 13, 1879	30,000
		Saginaw River .....	Cass River .....	Tuscola County, Mich .....	Feb. 13, 1879	30,000
		White River .....	Round Lake .....	Oceana County, Mich .....	Apr. 18, 1879	500
		White River .....	Crystal Lake .....	Oceana County, Mich .....	Apr. 18, 1879	500
			Private Ponds .....	Romeo, Mich .....	July 12, 1879	220
Minnesota .....	Red Wing, Minn .....	Mississippi River .....	Lakes .....	Goodhue County, Minn .....	July --, 1879	5,000
	do .....	Saint Croix River .....	Silver Lake .....	Washington County, Minn .....	July --, 1879	1,000
	do .....	Mississippi River .....	Mary's Creek .....	Mower County, Minn .....	July --, 1879	1,000
	do .....	Minnesota River .....	Cedar Lake .....	Watsonwan County, Minn .....	July --, 1879	1,000
	do .....	Minnesota River .....	Chain Lake .....	Watsonwan County, Minn .....	July --, 1879	1,000
	do .....	Minnesota River .....	Lake Alley .....	Renville County, Minn .....	July --, 1879	2,000
	do .....	Minnesota River .....	Lake Prescott .....	Renville County, Minn .....	July --, 1879	2,000
	do .....	Blue Earth River .....	Chain Lake .....	Martin County, Minn .....	July --, 1879	5,000
	do .....	Missouri River .....	Lake Letook .....	Lesenr County, Minn .....	July --, 1879	2,500
	do .....	Missouri River .....	Lake Takola .....	Lesenr County, Minn .....	July --, 1879	2,500
	do .....	Minnesota River .....	Lake Elysian .....	Waseca County, Minn .....	July --, 1879	5,000
	do .....	Minnesota River .....	Lakes .....	Douglas County, Minn .....	July --, 1879	3,000
	do .....	Mississippi River .....	Lakes .....	Wright County, Minn .....	July --, 1879	2,000
	do .....	Saint Croix River .....	Lake Elmo .....	Washington County, Minn .....	July --, 1879	2,000
	do .....		Lake Koronia .....		July --, 1879	3,000
	do .....	Pomme de Terre River .....	Lake Foss .....	Stevens County, Minn .....	July --, 1879	2,000
Missouri .....	California .....	Mississippi River .....	Meramec River .....	Franklin, Mo. .....	Dec. --, 1878	75,000
	do .....	Arkansas River .....	Spring River .....	Carthage, Mo. .....	Dec. --, 1878	75,000
Nevada .....	McCloud River station .....	Bear River .....	Truckee River .....	Reno, Nev. .....	Mar. --, 1879	150,000
		Carson River .....	Mexican Dam .....	Carson City, Nev .....	Mar. --, 1879	10,000
New Hampshire .....	Plymouth, N. H .....	Merrimac River .....	Pemigowasset River .....	Campton and Plymouth, N. H. .....	Feb. 1, 1879	317,000
	do .....	Salmon Falls .....	Newchewannauck Lake .....	Wakefield, N. H. .....	Mar. 14, 1879	5,000
	do .....	Salmon Falls .....	Tri Echo Lake .....	Milton, N. H. .....	Mar. --, 1879	5,000
	do .....	Salmon Falls .....	Lowell's Pond .....	Wakefield, N. H. .....	Mar. --, 1879	5,000
	do .....	Salmon Falls .....	Cook's Pond .....	Brookfield, N. H. .....	Mar. --, 1879	5,000
	do .....	Lake Winnepesogee .....	Smith's Pond .....	Wolfeborough, N. H. .....	Mar. --, 1879	10,000
	do .....	Merrimac River .....	Cottocook .....	Hillsborough Bridge, N. H. .....	Mar. --, 1879	20,000
	do .....	Delaware River .....	Shumaker's Eddy .....	30 miles north of Trenton .....	Mar. --, 1879	188,200
New Jersey .....	Bloomsbury, N. J .....	Great Egg Harbor .....	Great Egg Harbor River .....	Atlantic County, N. J .....	Mar. --, 1879	50,000
	do .....	Delaware River .....	Alloway's Creek .....	Salem County, N. J .....	Mar. --, 1879	25,000
	do .....	Delaware River .....	Maurice River .....	Cumberland County, N. J .....	Mar. --, 1879	25,000
	do .....	Delaware River .....	Racon Creek .....	Gloucester County, N. J. .....	Mar. --, 1879	25,000
	do .....	Great Bay .....	Mallica River .....	Gloucester County, N. J. .....	Mar. --, 1879	25,000
	do .....	Barlton River .....	North Branch .....	Somerset County, N. J. .....	Mar. --, 1879	30,000
	do .....	Passaic River .....	Rockaway River .....	Somerset County, N. J. .....	Mar. --, 1879	30,000
	do .....	Hackensack River .....	Hackensack River .....	Bergen County, N. J. .....	Mar. --, 1879	30,000
	do .....	Lake Hopatcong .....	Lake Hopatcong .....	Morris County, N. J. .....	Mar. --, 1879	5,000
	do .....	Shawngum Lake .....	Shawngum Lake .....		Mar. --, 1879	5,000
	do .....	Silver Lake .....	Silver Lake .....		Mar. --, 1879	3,000
	do .....	Greenwood Lake .....	Greenwood Lake .....	Passaic County, N. J. .....	Mar. --, 1879	22,000
	do .....	Swartwood Lake .....	Swartwood Lake .....	Sussex County, N. J. .....	Mar. --, 1879	10,000
	do .....	Verona Lake .....	Verona Lake .....		Mar. --, 1879	3,000

TABLE V.—Disposition of California salmon reared from eggs collected in 1878—Continued.

Date.	Where finally hatched.	Waters stocked.	Tributaries in which fish were placed.	Locality.	Date of transfer.	Number of fish.
New Jersey.....	Bloomsbury, N. J.....	Cline's Pond.....	Cline's Pond.....		Mar., 1878	10,000
New York.....		Hudson River.....	Tributaries of Hudson River.....	Greene County, N. Y.....	Dec. 5, 1878	20,000
		Genesee River.....	Spring Creek.....	Monroe County, N. Y.....	Dec. 31, 1879	10,000
	Caledonia, N. Y.....	Lake Ontario.....	Spring Creek.....	Livingston County, N. Y.....	Jan. 15, 1879	10,000
do.....		Hemlock Lake.....	Spring Brooks.....	Ontario County, N. Y.....	Feb. 26, 1879	35,000
do.....		Summer Hill Lake.....	Spring Brooks.....	Cayuga County, N. Y.....	Mar. 1, 1879	9,000
do.....		Lake Ontario.....	Spring Creek.....	Livingston County, N. Y.....	Mar. 11, 1879	1,000
North Carolina.....	Henry's, N. C.....	Cape Fear River.....	North Fork Deep River.....	Friendship, N. C.....	Jan. 2, 1879	18,000
do.....		Catawba River.....	John's River and Upper Creek.....	Morgantown, N. C.....	Jan. 10, 1879	30,000
do.....		Catawba River.....	Luxville River.....	Bridgewater, N. C.....	Jan. 11, 1879	30,000
do.....		Roanoke River.....	Doe River.....	Danbury, N. C.....	Jan. 13, 1879	20,000
do.....		Broad River.....	Broad River.....	Hickory-aut Gap, N. C.....	Jan. 15, 1879	45,000
do.....		Roanoke River.....	Town Fork River.....	Germantown, N. C.....	Jan. 18, 1879	15,000
do.....		Pee-Dee River.....	Yadkin River.....	Patterson's (Caldwell Co.), N. C.....	Dec. 16, 1878	30,000
do.....		Pee-Dee River.....	Yadkin River.....	Patterson's (Caldwell Co.), N. C.....	Dec. 18, 1878	30,000
do.....		Broad River.....	North Pacolet River.....	Near Hendersonville, N. C.....	Dec. 20, 1878	5,000
do.....		Broad River.....	Green River.....	Near Hendersonville, N. C.....	Dec. 20, 1878	20,000
do.....		Cape Fear River.....	Bull Run Creek.....	Near Jamestown, N. C.....	Dec. 27, 1878	20,000
do.....		Cape Fear River.....	North Fork Deep River.....	Near Jamestown, N. C.....	Dec. 31, 1878	24,500
	Total.....					4,460,356
Canada.....	Newcastle hatchery.....	Lake Ontario.....	Wilmots Creek.....	Provinces of Ontario.....	Spring, 1879	1,000
do.....		Lake Huron.....	Saugeen's River.....	Provinces of Ontario.....	Spring, 1879	500
do.....		Lake Ontario.....	River Trent.....	Provinces of Ontario.....	Spring, 1879	200

## APPENDIX TO SALMON-HATCHING REPORT, 1880.

NEWCASTLE, March 4, 1880.

LIVINGSTON STONE, Esq.,

*Deputy Commissioner United States Fisheries :*

MY DEAR MR. STONE: In addition to the information asked in your note and blank form, sent to be filled up in regard to the California eggs, I beg to send you the following statement, in detail, so that you may draw your own conclusions from it:

In October, 1874, first lot of 20,000 eggs received; May, 1875, turned out as fry.

In October, 1875, second lot of 80,000 eggs received; April, 1876, turned out as fry.

In October, 1876, a small California salmon, about 15 inches long, came up the stream and into the house, full of milt.

In October, 1876, third lot of 8,000 eggs were received; in April, 1877, turned out as fry.

In July, 1877, a beautiful 5-pound California salmon was taken in my nets along with our salmon in Lake Ontario, and during my absence two other smaller ones were taken in like manner.

In October, 1877, three California salmon came up the stream into our reception house, all males; the largest one was 23 inches long, very slim, and very dirty looking.

In October, 1877, fourth lot of 40,000 eggs were received; April, 1878, put out as fry.

In July, 1878, J. J. Robson, esq., had charge of the nets in my absence, and he reported a California salmon of 15 pounds being taken in the nets; also two or three small ones.

In October, 1878, fifth lot of 500,000 eggs received; all turned bad but 2,000.

In April, 1879, put out 1,700 fry.

The above is the history of the California eggs got by me from Professor Baird. The salmon taken in July, 1877, of 5 pounds' weight, was as beautiful, fat, and finely-developed a fish as I ever saw of the salmon family. I skinned and mounted the fish, and have him now in my possession. This fish must have come from the first lot of eggs got by me in the fall of 1874 and turned out as fry in April, 1875; therefore it was only two years and three months old from the hatching out from the egg, or rather from the time of turning out as fry, as the eggs hatched out during the winter were retained in the hatching-troughs till April.

Now, what has become of all the rest of these fry I cannot tell, perhaps you can; if you can't, Seth Green surely can tell all about them. One thing is certain, they have not peopled Lake Ontario in the countless myriads that Seth's shad did the next season after they were turned out as fry.

I must confess that I am quite upset on this question of where these fry go to. I have never seen a "parr" or a "smolt" of these Californians yet in this stream, but I have raised large numbers of them to those stages of their growth in spring-water tanks and put them out, but have never seen any afterwards, except the ones described as above, which were, I should say, in the grilse stage (except the first one) in October, 1876 (I did not see the one reported by Mr. Robson of 15 pounds' weight, in July, 1878, and cannot, therefore, say anything about it, only simply expressing a doubt of its being a "Simon pure" Californian). But, then, here comes in the rub, if any "*five-pounder*" (a thoroughbred one, too) attained that size and weight in twenty-seven months, why haven't some others done the same thing? and if they have, where are they? I believe in perseverance upon the principle that "Faint heart never won fair lady," but then there are lots of people the antipodes to myself who say "Hope deferred maketh the heart sick," and do not believe in "Hope on, hope ever."

I should like very much, indeed, to have a long confab with the Professor and yourself about these truant fish. My own private opinion (but never expressed before) is, that these California fry will not stand as high a temperature of water as our own; this, I think, will be somewhat verified in your own reports of the temperature of the McCloud River, which in July, August, and September averaged about 57°, 55°, 52°. This is colder by some 15 to 20° at these periods than our streams in Ontario. On a trip I made last July up our most famous salmon river, the Restigouche, I found the temperature thus: 60° some 80 miles up from tideway and 52° 130 miles up. I don't know how far your works are up from tide-water on the McCloud, but I should infer they are not that distance; if not, the McCloud water must be very much colder than any of our Atlantic rivers. In fact, looking at your record of temperature and comparing with some of ours, the McCloud is many degrees colder than any of our New Brunswick or Nova Scotia rivers, and far, far colder than any of our Ontario streams. Therefore, by this comparison the California salmon are natives of colder waters than ours, and consequently it is much less suitable to their growth than for our own salmon. Farther observation on my part will go to prove this still more, that whilst I have raised plenty of California parrs and even smolts in spring water at 40° to 50° and 55°, where they thrive very well, I have never yet seen a single one in my creek from the thousands I had put into it as fry. Again, I have taken some of the parrs and smolts from the spring-water tanks and put them into a small pond



with a flow of the creek water through it, and shortly afterwards they got covered with small black specks, as if dotted all over with ink.

The spots or specks protruded a little, and the fish in handling felt like a rasp, and soon died, in a lean, lank condition; some were put back again in the "spotted" state to the spring water of 50°, and after awhile recovered. This occurred with our own salmon, parrs and smolts also, but not to such an extent as with the Californians. I am therefore almost constrained to say that the Californians must be natives of colder waters than our own salmon. I notice that the "sun heat" at your works is at times almost beyond endurance, running up to 100° or 125°, far beyond what it is with us. That, however, has nothing to do with my present statement, viz, that your recorded temperature of water where you gather your eggs is infinitely colder than any of our river waters at that period of the year. I therefore fear very much that the Pacific salmon don't thrive in our Ontario waters (though there may be exceptions, like my "five-pounder"), and I should judge that the waters in most of your States is not unlike ours; and I almost go further in giving it as my belief that even the Atlantic and the Wilmot salmon must give way to the increased temperature of our Ontario streams and their consequent impurities, which is growing upon us annually from the clearing off the forests, which reduces the volume of water in the creeks and rivers and gives them greater exposure to the influences of the sun's rays.

May I ask you this question: Do the salmon of their own accord spawn in the river as low down as where your works are situated on the McCloud River? or, if they do, is it not because they are prevented from going farther up stream on account of your weir across it?

You must excuse this literally long scrawl, for it is written in the most hurried and impromptu manner just on the eve of my going away for a few days from home. When I sat down to write you about the blank returns sent me I did not dream of entering into the subject of this California question, but when started I could not well knock off, and so have extended it perhaps beyond decorum. The subject is a very large one, and I should, as before stated, like much to have a few hours' talk with you, who are so well acquainted with this Pacific fish.

Believe me to be yours, respectfully,

SAMPL WILMOT.

