

XXIX.—REPORT OF OPERATIONS AT THE SALMON-BREEDING STATION OF THE UNITED STATES FISH COMMISSION ON THE M'CLOUD RIVER, CALIFORNIA, DURING THE SEASON OF 1882.

BY LIVINGSTON STONE.

Some apprehensions were felt at the close of the last season lest there should be a recurrence of the high water which proved so disastrous to this station last year. It is true the buildings are all above the danger mark of the rising water, but, nevertheless, such high water as occurred here in the winter of 1880-'81 would do a good deal of damage to roads and trails and flumes, even if the buildings were left uninjured. As it happened, however, the rise in the river was very slight, and no injury whatever resulted to anything connected with the station.

It was my expectation to return to the McCloud River as early as June, but Congress not making the necessary appropriations until August, I did not arrive there till the first of September. In the meantime Congress had voted to extend the appropriation of the previous year for twenty days, or till July 20. On the strength of this supplementary appropriation, I had been authorized to have such preparatory work done as was necessary for putting things in readiness for the season's campaign. This enabled us to labor on the wheel and bridge, and when the appropriation was finally made, the work was so far along that our preparations for taking eggs were easily finished by the time the spawning season was fairly inaugurated.

When I arrived at the fishery, everything in the hatching-house was in readiness to receive the eggs, the seining ground was cleared, the spawning shanty built, the McCloud River bridged over and fenced against the salmon, and our great 32-foot current wheel in place and raising its 20,000 gallons of water per hour into the hatching-troughs. The credit of keeping the fishery property in such good condition during my absence is due to Mr. Robert Radcliff, whom I had left in charge the previous October, and the credit of conducting the preparatory work for the season's operations so thoroughly is due to Mr. George B. Williams, jr., who took the management of the work on the 1st of July.

On the 2d of September we made a trial haul of salmon to ascertain what condition they were in. We caught twenty-five ripe females, and I decided to begin taking eggs the next day. The next day we began collecting eggs, and continued at it, Sundays excepted, until September 25, at which time we had over 4,000,000 in the hatching-house.

My instructions directed me to take three or four million eggs only, and to give them, when taken, to the California fish commission, to be hatched out by them for the benefit of the Sacramento River.

Allow me to say here that one of the last official acts of the late Hon. B. B. Redding, as California fish commissioner, before he died, was to write a letter to Professor Baird in regard to this station, in which he stated that several hundred thousand dollars had been invested in canneries on the Sacramento River, that 1,600 men were employed in these canneries, and that this capital and these men would be ultimately thrown out of employment if the salmon hatching at this station should be given up. He also stated that the hatching of salmon here had increased the annual salmon catch of the Sacramento 5,000,000 pounds a year, and that the canneries on the river were dependent upon the salmon hatching of this station for their maintenance.

It was fortunate that no more than three or four million eggs were wanted this season, for the breeding salmon were extremely scarce, and with the utmost exertions we could not average over a quarter of a million eggs a day. It would probably have been impossible to take the eight or nine million that we have taken during previous seasons.

As a partial compensation for the numerical deficiency of the fish, they exceeded in weight the breeders of any previous season, the average weight of the females after spawning being 14 pounds. I think that we found the largest spawning female salmon this season that we have ever taken eggs from. This one weighed 23½ pounds after the eggs were taken from her, making her entire weight with the eggs upwards of 27 pounds.

The Indians this year have been very friendly, and those that we have employed have worked well. Twice, when the seine got snagged in deep water, it would have been almost impossible for us to have freed it without Indian help. On each occasion they dove for the net and released it, the water being quite deep and at the time almost like ice water.

An Indian named Jeff Davis freed the net both times, I believe. He is a very bright Indian, and he amused us very much by one of his remarks this fall. Many thousand pounds of dead salmon float down against our bridge in September. They are spoiled, of course, and we usually throw them over into the river below the bridge to relieve the racks of the pressure. This year I thought I would utilize them by putting them in the garden for a fertilizer. This was an entirely novel thing to the Indians, and Jeff was very much exercised about it. He said: "What you bury dead salmon in the garden for? I never heard of any one burying dead salmon. Next year you will be burying dead Injuns in the garden."

We still find the Indians' help invaluable. They are the best men we could have when work is to be done in the water or fish are to be handled.

As soon as all our season's eggs were taken they were turned over to the California State fish commission to be hatched. This was on the 25th of September. I remained at the fishery until the middle of Octo-

ber, when I went east, and left the premises again in charge of Mr. Radcliff.

Below will be found tables showing: I, the number and character of seine hauls made; II, the daily take of salmon eggs; III, air and water temperatures from November 1, 1881, to October 1, 1882; IV, the results of 12 experiments conducted with salmon eggs; and V, a catalogue of birds' nests and eggs collected on the McCloud River in the spring and early summer of 1882.

I.—Record of seining operations conducted at the salmon-breeding station on the McCloud River, California, from September 2, 1882, to September 25, 1882, on account of the United States, by Livingston Stone.

Date.	Hour.	Temperature of—		Fish taken.		Ripe fish.	
		Air.	Surface-water.	Males.	Females.	Males.	Females.
Sept. 2	3.00 p. m.	92	56	85	12	35	8
2	4.30 p. m.	80	56	20	8	20	0
2	5.15 p. m.	72	56	75	29	75	10
2	5.45 p. m.	70	56	50	20	50	9
2	7.00 p. m.	62	56	200	95	200	20
2	8.30 p. m.	58	55	100	45	100	11
2	9.25 p. m.	57	55	40	22	40	6
3	5.00 a. m.	57	55	80	4	30	0
3	5.35 a. m.	48	50	40	20	40	5
3	7.30 a. m.	49	50	4	4	4	2
3	9.30 a. m.	52	50	25	14	25	4
3	6.30 p. m.	68	56	15	6	15	2
3	7.00 p. m.	63	54	0	0	0	0
3	7.40 p. m.	60	54	40	18	40	8
3	8.40 p. m.	56	53	8	6	8	2
3	10.00 p. m.	53	53	25	11	25	8
4	5.30 a. m.	48	50	30	20	30	6
4	5.50 a. m.	42	50	110	41	110	11
4	6.30 a. m.	42	50	2	0	2	0
4	7.40 a. m.	63	52	30	17	30	7
4	9.00 a. m.	68	54	50	13	50	3
4	7.30 p. m.	70	50	25	9	25	8
4	9.00 p. m.	60	50	75	40	75	13
4	9.25 p. m.	52	55	30	12	30	3
5	5.30 a. m.	52	50	15	9	15	5
5	6.00 a. m.	50	50	20	13	20	5
5	6.50 a. m.	40	50	50	36	50	14
5	7.50 a. m.	50	50	15	0	15	0
5	9.30 a. m.	62	50	17	2	17	2
5	4.00 p. m.	90	58	8	0	8	0
5	7.45 p. m.	60	54	14	2	14	2
5	8.15 p. m.	60	54	14	4	14	3
5	8.30 p. m.	56	52	16	4	16	2
5	9.15 p. m.	56	51	25	9	25	5
5	10.00 p. m.	54	50	28	12	28	4
6	5.10 a. m.	50	50	18	14	18	5
6	6.00 a. m.	50	50	18	9	18	6
6	6.30 a. m.	52	50	20	10	20	5
6	8.00 a. m.	60	52	32	24	32	11
6	9.15 a. m.	70	52	20	6	20	2
6	10.00 a. m.	76	50	14	2	14	2
6	4.15 p. m.	80	52	5	5	24	2
6	5.00 p. m.	72	53	50	50	50	25
6	5.20 p. m.	66	53	12	6	12	1
6	7.00 p. m.	66	54	25	23	25	11
6	8.30 p. m.	58	54	20	6	20	0
6	9.20 p. m.	56	54	20	10	20	4
7	5.15 a. m.	42	50	30	18	30	8
7	5.85 a. m.	42	50	35	27	35	13
7	6.00 a. m.	50	50	18	12	18	5
7	7.25 a. m.	50	50	12	5	12	2
7	7.55 a. m.	50	52	20	22	20	8
7	9.15 a. m.	70	50	24	3	24	0
7	9.35 a. m.	70	50	26	3	26	0
7	4.15 p. m.	88	56	12	4	12	3
7	4.55 p. m.	78	56	8	8	8	4
7	6.00 p. m.	70	54	28	8	28	8
7	6.15 p. m.	64	54	8	1	8	0
7	7.10 p. m.	60	53	40	20	40	8
7	7.50 p. m.	60	52	32	12	32	4
7	8.30 p. m.	60	52	38	17	38	5

I.—Seining operations conducted at salmon-breeding station on McCloud River, &c.—Cont'd.

Date.	Hour.	Temperature of—		Fish taken.		Ripe fish.	
		Air.	Surface-water.	Males.	Females.	Males.	Females.
Sept. 7	9. 15 p. m.	58	51	10	4	10	6
7	10. 00 p. m.	58	51	25	16	25	12
8	5. 00 a. m.	46	50	30	36	30	7
8	5. 20 a. m.	46	50	14	25	14	17
8	5. 50 a. m.	47	50	24	33	24	3
8	6. 20 a. m.	48	50	8	5	8	0
8	7. 35 a. m.	50	50	6	1	6	1
8	9. 22 a. m.	70	50	50	25	50	13
8	10. 10 a. m.	72	50	8	2	8	0
8	6. 35 p. m.	66	52	30	18	30	6
8	6. 55 p. m.	60	52	35	16	35	10
8	7. 30 p. m.	60	52	22	14	22	8
8	8. 10 p. m.	60	52	12	2	12	1
8	8. 50 p. m.	56	52	4	1	4	0
8	9. 50 p. m.	54	52	15	17	15	6
9	5. 15 a. m.	42	50	12	7	12	5
9	5. 35 a. m.	42	50	26	25	26	22
9	6. 15 a. m.	40	50	20	17	20	12
9	6. 40 a. m.	52	50	22	11	22	7
9	8. 10 a. m.	60	59	10	4	10	2
11	5. 00 a. m.	40	50	26	26	26	14
11	5. 30 a. m.	46	50	40	33	40	15
11	6. 10 a. m.	46	50	40	59	40	39
11	7. 30 a. m.	58	50	26	26	24	12
11	9. 15 a. m.	60	50	50	29	50	11
11	4. 45 p. m.	84	64	75	7	75	3
11	6. 20 p. m.	68	62	14	15	14	7
11	7. 20 p. m.	66	62	14	7	14	4
11	8. 05 p. m.	62	62	14	7	14	3
11	8. 55 p. m.	60	50	40	7	40	3
11	9. 45 p. m.	60	50	14	7	14	3
12	5. 00 a. m.	50	50	12	28	12	16
12	5. 30 a. m.	50	50	8	8	8	3
12	6. 10 a. m.	50	50	6	7	6	3
12	7. 45 a. m.	55	52	12	11	12	6
12	8. 00 a. m.	60	52	6	3	6	1
12	9. 25 a. m.	70	53	10	7	10	4
12	5. 00 p. m.	80	54	8	6	8	3
12	7. 05 p. m.	78	54	8	5	8	1
12	7. 35 p. m.	66	52	16	13	16	7
12	8. 15 p. m.	60	52	24	19	24	10
12	9. 00 p. m.	58	52	18	10	18	6
12	10. 05 p. m.	56	50	10	6	10	2
13	5. 15 a. m.	48	50	10	14	10	11
13	5. 50 a. m.	40	50	24	36	24	24
13	6. 40 a. m.	54	50	26	20	26	9
13	8. 00 a. m.	62	50	32	38	32	16
13	8. 15 a. m.	64	50	10	2	10	0
13	9. 50 a. m.	70	60	25	15	25	5
13	4. 50 p. m.	94	64	14	11	14	5
13	7. 15 p. m.	66	54	12	10	12	6
13	8. 00 p. m.	62	53	6	3	6	1
13	8. 25 p. m.	60	53	9	0	9	5
13	9. 00 p. m.	60	52	6	0	6	0
13	9. 55 p. m.	58	52	12	9	12	5
14	5. 05 a. m.	48	50	12	20	12	10
14	5. 35 a. m.	48	50	8	10	8	7
14	6. 05 a. m.	44	50	9	9	8	6
14	6. 30 a. m.	46	50	9	7	9	0
14	7. 50 a. m.	50	50	10	1	10	.....
14	8. 00 a. m.	50	50	12	4	12	3
14	9. 30 a. m.	64	50	24	8	24	4
14	6. 05 p. m.	84	54	12	9	12	.....
14	6. 20 p. m.	70	54	16	8	16	5
14	7. 10 p. m.	84	54	.....	.....	.....	5
14	8. 00 p. m.	84	52	.....	7	8	.....
14	9. 00 p. m.	84	52	3	3	3	1
15	5. 50 a. m.	56	52	5	17	5	14
15	6. 10 a. m.	54	52	10	7	10	5
15	6. 25 a. m.	54	52	6	6	12	2
15	7. 55 a. m.	50	52	8	7	8	4
15	8. 10 a. m.	56	52	8	2	8	2
15	9. 40 a. m.	58	52	0	3	9	3
15	10. 15 a. m.	60	52	.....	.....	10	.....
15	11. 00 a. m.	60	52	.....	2	12	2
15	6. 35 p. m.	58	52	24	7	24	7
15	7. 00 p. m.	58	52	12	6	12	6
15	7. 50 p. m.	58	52	16	1	16	1
15	8. 50 p. m.	52	52	8	14	8	4

I.—Seining operations conducted at salmon-breeding station on McCloud River, &c.—Cont'd.

Date.	Hour.	Temperature of—		Fish taken.		Ripe fish.	
		Air.	Surface-water.	Males.	Females.	Males.	Females.
Sept. 15	9.50 p. m.	52	52	8	12	8	4
16	5.30 a. m.	50	50	3	22	3	14
16	5.50 a. m.	42	50	7	17	7	7
16	7.15 a. m.	40	50	5	12	5	7
16	7.40 a. m.	40	50	14	32	14	20
16	7.55 a. m.	42	50	12	19	12	11
16	5.50 p. m.	65	50	4	11	4	5
18	6.15 a. m.	44	50	8	20	8	12
18	3.35 a. m.	46	50	4	13	4	7
18	7.30 a. m.	46	50	20	2	26	
18	8.10 a. m.	46	50	7		7	
18	8.40 a. m.	48	50	5	7	5	5
18	10.15 a. m.	51	50	16		16	
18	6.45 p. m.	58	52	6	6	6	2
18	7.00 p. m.	58	52	10	8	10	2
18	7.45 p. m.	56	52	2	2	2	2
18	8.35 p. m.	54	52	2	5	2	5
18	9.30 p. m.	54	52	2	2	2	2
18	10.20 p. m.	48	52	2	2	2	1
19	5.00 a. m.	48	50	2	7	2	7
19	5.30 a. m.	48	50	1	8	1	8
19	6.05 a. m.	50	50	10	4	10	4
19	6.45 a. m.	54	50	5	1	5	1
19	8.15 a. m.	58	50	10	1	10	1
19	8.45 a. m.	60	52	8	1	8	1
19	6.20 p. m.	66	52	2	8	2	8
19	6.35 p. m.	62	52	7	2	7	2
19	7.10 p. m.	62	52	2	5	2	5
19	8.00 p. m.	60	52	2	2	2	2
19	8.45 p. m.	58	52				
19	9.45 p. m.	54	52		3		3
20	4.45 a. m.	46	50	2	12	2	12
20	5.15 a. m.	48	50	1	8	1	8
20	5.45 a. m.	48	50	4	4	4	4
20	6.15 a. m.	48	50	4	4	4	4
20	7.30 a. m.	48	50	4			
20	7.45 a. m.	48	50	12	2	12	2
20	6.00 p. m.	66	52	2			
20	6.15 p. m.	64	52	2			
20	7.00 p. m.	62	52	2			
20	7.35 p. m.	58	52	1	1	1	1
21	3.45 a. m.	48	50	8	8	8	3
21	4.05 a. m.	48	50	2	2	2	2
21	4.50 a. m.	48	50	1	8	1	8
21	5.30 a. m.	48	50	6	2	6	2
21	5.50 a. m.	48	50	5	1	5	1
21	6.30 a. m.	46	50	12	2	12	2
21	7.40 a. m.	48	50	12	5	12	5
21	8.15 a. m.	54	50	10			
21	6.45 p. m.	62	52	3	2	3	2
21	7.30 p. m.	62	52	3	2	3	2
21	8.30 p. m.	58	52	2	2	2	2
24	9.00 p. m.	52	52	5			5
22	3.45 a. m.	44	50	2	1	2	1
22	4.10 a. m.	42	50	1	1	1	1
22	5.00 a. m.	42	50		6		6
22	5.40 a. m.	42	50	8	6	8	6
22	6.20 a. m.	42	50	10	2	10	2
22	8.00 a. m.	50	50	7	1	7	1
22	8.35 a. m.	58	50	8	1	8	1
22	7.20 p. m.	60	53	1	1	1	1
22	8.00 p. m.	56	52	1	4	1	4
22	9.00 p. m.	56	52	1			1
23	3.40 a. m.	42	50	3	2	3	1
23	4.20 a. m.	44	50	1	4	1	4
23	5.00 a. m.	44	50	2			2
23	5.35 a. m.	42	50				
23	6.35 a. m.	40	50	3	3	3	3
23	8.00 a. m.	52	50	1			1
23	8.30 a. m.	62	50	3			
23	8.00 p. m.	60	52				
23	8.25 p. m.	56	52	2		2	
23	8.45 p. m.	54	52	1		1	
24	6.00 a. m.	40	50	1	1	1	1
24	6.30 a. m.	40	48	3	3	3	3

NOTE.—The condition of sky and water was reported "clear" from September 3, 8.00 p. m. till September 7, 9.15 a. m., after which there were no reports.

II.—Daily record of salmon eggs taken at the United States salmon-breeding station on the McCloud River, California, during the season of 1882.

Date.			Number of female salmon spawned.	Number of eggs taken.	Date.			Number of female salmon spawned.	Number of eggs taken.
September	3	.....	17	78,800	September	15	.....	45	181,100
	4	.....	86	327,350		16	.....	62	255,600
	5	.....	36	185,400		18	.....	44	175,500
	6	.....	86	335,900		20	.....	27	111,700
	7	.....	40	154,700		20	.....	31	127,500
	8	.....	88	356,150		21	.....	30	129,200
	9	.....	53	204,650		22	.....	28	134,600
	11	.....	100	373,100		24	.....	29	121,800
	12	.....	52	177,400				999	3,991,750
	13	.....	101	379,200					
	14	.....	44	202,900					
Average number of eggs to each fish									3,995

To this total of the eggs regularly taken are to be added 80,300 taken for purposes of experiment, making a grand total of 4,072,050 eggs as the result of the season's operations.

III.—Table of temperatures taken at the United States salmon-breeding station, McCloud River, California, during the season of 1882.

Month.	Air.				Water.			Weather.
	Shade.			Sun.	7 A. M.	3 P. M.	7 P. M.	
	7 A. M.	3 P. M.	7 P. M.	3 P. M.				
Nov. 1	44	72	.....	78	44	48	.....	Clear.
2	46	74	.....	80	45	48	47	Do.
3	38	73	.....	80	44	48	47	Clear a. m.; Cloudy p. m.
4	42	73	.....	80	44	48	46	Do.
5	40	76	.....	72	45	48	47	Cloudy.
6	40	68	.....	72	45	48	47	Do.
7	34	80	.....	48	44	47	45	Clear.
8	32	70	.....	46	43	45	45	Do.
9	32	65	.....	42	42	44	44	Do.
10	38	70	.....	50	43	45	45	Do.
11	36	68	.....	50	43	45	45	Do.
12	35	42	.....	50	43	48	45	Do.
13	48	66	.....	53	45	47	46	Cloudy.
14	54	56	.....	53	46	49	46	Rain.
15	38	57	.....	48	46	47	45	Do.
16	35	56	.....	40	44	44	45	Do.
17	32	57	.....	44	43	45	46	Do.
18	25	57	.....	45	42	45	44	Clear.
19	26	70	.....	46	42	45	42	Do.
20	34	70	.....	50	42	45	44	Do.
21	48	70	.....	50	42	46	43	Do.
22	45	70	.....	50	42	44	44	Do.
23	38	74	.....	46	42	42	43	Do.
24	36	70	.....	50	42	46	44	Do.
25	38	72	.....	50	43	46	44	Do.
26	34	66	.....	52	42	44	44	Do.
27	41	62	.....	54	44	44	45	Cloudy
28	50	60	.....	50	46	46	46	Do.
29	38	64	.....	50	44	46	44	Clear.
30	36	64	.....	42	42	42	44	Rain.
Dec. 1	37	70	.....	44	42	42	43	Clear.
2	34	50	.....	46	44	44	44	Cloudy.
3	34	50	.....	48	43	44	44	Do.
4	42	46	.....	45	43	43	43	Rain.
5	58	56	.....	60	44	47	47	Do.
6	52	60	.....	54	62	50	47	Do.
7	46	64	.....	50	46	47	45	Clear.

III.—Table of temperatures taken at the salmon-breeding station, McCloud River, &c.—Cont'd.

Month.	Air.				Water.			Weather.	
	Shade.			Sun.	7 A. M.	3 P. M.	7 P. M.		
	7 A. M.	3 P. M.	7 P. M.	3 P. M.					
Dec.	8	38	62	45	64	44	46	44	Clear.
	9	34	60	48	70	42	44	44	Do.
	10	44	52	45	52	44	44	42	Rain.
	11	34	48	48	50	42	48	44	Cloudy.
	12	37	52	44	52	43	46	44	Do.
	13	36	62	46	74	42	46	43	Clear.
	14	32	60	46	62	42	44	45	Do.
	15	40	52	45	52	43	44	44	Rain.
	16	34	60	60	70	42	46	44	Clear.
	17	36	62	54	70	41	44	44	Do.
	18	48	72	50	72	44	44	44	Do.
	19	48	64	45	78	43	46	44	Do.
	20								
	21								
	22	32	60	48	72	42	44	42	Clear.
	23	36	64	.....	76	44	44	44	Do.
	24	36	52	.....	54	43	44	44	Do.
	25	34	47	.....	52	42	44	44	Do.
	26	36	44	.....	42	42	43	38	Snow.
	27	50	40	.....	40	40	44	42	Rain.
	28	46	52	.....	41	42	44	44	Cloudy.
	29	38	66	.....	82	42	46	44	Clear.
	30	38	62	.....	66	42	44	43	Do.
	31	36	62	.....	76	42	44	48	Do.
1882.									
Jan.	1	44	54	46	60	43	44	43	Clear.
	2	46	54	50	.....	44	44	44	Rain.
	3	50	60	58	.....	45	46	44	Do.
	4	52	54	44	.....	46	45	45	Do.
	5	50	62	52	.....	45	46	46	Do.
	6	42	54	42	60	46	45	44	Clear.
	7	32	50	40	62	41	44	44	Do.
	8	30	52	41	72	41	45	42	Do.
	9	32	60	40	76	42	44	42	Do.
	10	32	54	38	56	41	43	42	Do.
	11	36	52	38	56	40	43	41	Do.
	12	26	52	38	60	40	42	42	Do.
	13	20	56	40	70	39	42	42	Do.
	14	38	62	44	74	40	44	42	Do.
	15	36	52	44	70	40	44	42	Do.
	16	37	62	54	76	40	44	42	Do.
	17	30	62	50	70	40	44	43	Do.
	18	32	58	45	70	41	44	42	Do.
	19	32	60	44	80	40	42	42	Do.
	20	32	60	44	70	40	44	42	Do.
	21	30	58	44	62	40	42	41	Cloudy.
	22	34	48	46	50	40	42	42	Do.
	23	40	46	42	50	42	44	42	Do.
	24	40	44	40	.....	42	42	41	Do.
	25	40	40	40	.....	42	44	41	Do.
	26	42	44	38	.....	42	43	41	Do.
	27	39	46	34	60	41	44	41	Do.
	28	31	54	38	74	40	44	41	Clear.
	29	30	50	32	58	40	44	40	Do.
	30	28	52	42	60	40	42	41	Do.
	31	35	52	42	70	40	44	41	Do.
Feb.	1	30	56	46	38	40	44	41	Do.
	2	38	70	44	32	40	42	41	Do.
	3	28	68	44	30	40	44	41	Do.
	4	29	68	50	34	40	44	41	Do.
	5	30	50	40	60	41	44	42	Do.
	6	29	52	36	70	40	44	42	Do.
	7	36	56	38	72	40	42	42	Do.
	8	36	50	40	.....	41	42	43	Do.
	9	38	52	52	.....	42	44	44	Rain.
	10	40	52	41	64	43	42	42	Clear.
	11	32	46	38	50	42	44	42	Cloudy.
	12	34	40	40	40	42	42	42	Snow, 4 inches.
	13	30	50	38	62	41	44	42	Clear.
	14	60	66	.....	92	41	46	44	Do.
	15	40	62	40	70	41	44	42	Do.
	16	30	38	40	.....	43	42	41	Snow.
	17	32	42	40	64	44	44	41	Clear.
	18	32	42	40	74	44	44	42	Do.
	19	28	50	40	70	39	42	42	Do.

III.—Table of temperatures taken at salmon-breeding station, McCloud River, &c.—Cont'd.

Month.	Air.				Water.			Weather.	
	Shade.			Sun.	7 A. M.	3 P. M.	7 P. M.		
	7 A. M.	3 P. M.	7 P. M.	3 P. M.					
Feb.	20	50	62	42	68	42	44	42	Clear.
	21	46	66	46	70	42	44	43	Do.
	22	36	52	46	.....	42	42	44	Cloudy.
	23	46	48	46	.....	45	44	46	Rain.
	24	45	48	46	.....	46	46	46	Do.
	25	45	53	50	.....	46	52	48	Do.
	26	46	58	49	.....	46	46	46	Do.
	27	46	50	48	.....	46	46	46	Do.
	28	46	50	48	.....	45	52	47	Do.
Mar.	1	46	58	56	60	47	48	48	Do.
	2	36	40	50	.....	46	46	48	Do.
	3	32	52	40	58	44	44	44	Clear.
	4	38	52	46	54	44	46	44	Do.
	5	32	54	40	82	44	46	44	Do.
	6	32	60	46	76	42	46	44	Do.
	7	34	66	52	78	42	46	45	Do.
	8	34	58	46	78	42	46	45	Do.
	9	28	52	44	52	42	44	44	Do.
	10	30	44	41	48	42	45	44	Snow.
	11	34	60	44	80	42	45	45	Clear.
	12	36	67	46	82	43	46	45	Do.
	13	40	50	45	.....	44	40	45	Rain.
	14	42	50	42	.....	44	40	43	Do.
	15	36	44	44	.....	43	44	43	Snow.
	16	38	46	42	62	44	46	45	Clear.
	17	37	50	40	.....	44	46	46	Rain.
	18	38	50	42	55	44	46	46	Clear.
	19	35	50	42	52	44	46	46	Do.
	20	32	62	44	90	44	46	47	Do.
	21	36	72	.....	97	44	46	44	Do.
	22	46	80	61	100	46	50	50	Do.
	23	45	82	62	102	46	50	50	Do.
	24	46	82	63	94	46	50	50	Do.
	25	44	.....	.....	72	48	.....	48	Do.
	26	.....	.....	.....	96	50	.....	50	Do.
	27	44	80	.....	114	48	50	.....	Do.
	28	46	82	70	94	48	50	70	Do.
	29	46	86	50	100	48	50	50	Do.
	30	52	88	.....	100	48	.....	.....	Do.
Apr.	31	.....	.....	.....	90	.....	52	.....	Do.
	1	70	.....	.....	82	.....	52	.....	Do.
	2	72	.....	.....	80	52	52	52	Do.
	3	50	76	62	82	50	52	52	Cloudy.
	4	46	68	56	60	50	52	52	Clear.
	5	44	74	58	90	50	52	54	Clear.
	6	54	54	.....	60	50	52	.....	Rain.
	7	.....	56	.....	86	50	50	.....	Clear.
	8	32	64	45	70	44	50	52	Do.
	9	.....	.....	.....	64	.....	46	.....	Rain.
	10	42	48	46	64	.....	46	52	Do.
	11	46	62	50	72	44	52	50	Clear.
	12	46	72	58	80	50	52	52	Do.
	13	.....	78	.....	96	50	52	52	Do.
	14	48	.....	.....	94	.....	54	54	Do.
	15	.....	86	.....	100	52	54	.....	Do.
	16	.....	68	.....	94	.....	54	.....	Do.
	17	.....	62	54	94	.....	54	52	Do.
	18	44	68	64	90	50	52	50	Do.
	19	.....	68	.....	78	.....	52	52	Do.
	20	36	58	50	68	44	54	46	Do.
	21	36	66	52	76	44	50	50	Do.
	22	52	62	56	64	42	46	40	Do.
	23	50	56	46	70	42	46	40	Do.
	24	.....	52	48	64	.....	42	48	Do.
	25	36	62	54	82	44	48	40	Do.
	26	34	72	64	92	46	48	52	Do.
	27	50	74	64	98	50	52	52	Do.
	28	52	84	66	100	50	52	52	Do.
	29	50	88	70	104	50	54	52	Do.
	30	64	82	66	100	52	54	52	Do.
May	1	56	72	66	74	52	54	52	Do.
	2	56	72	66	74	52	54	52	Rain.
	3	54	56	52	70	50	50	50	Do.
	4	52	54	52	70	48	48	46	Do.
	5	50	62	52	80	48	46	46	Clear.
	6	42	72	62	96	44	46	46	Do.
	7	48	72	62	102	46	48	48	Do.

III.—Table of temperatures taken at salmon-breeding station, McCloud River, f-c—Cont'd.

Month.	Air.				Water.			Weather.	
	Shade.			Sun.	7 A. M.	3 P. M.	7 P. M.		
	7 A. M.	3 P. M.	7 P. M.	3 P. M.					
May	8							Clear.	
	9							Do.	
	10	54	84	70	92	46	52	48	Do.
	11	58	76	66	90	52	52	48	Do.
	12	46	60	52	94	44	50	46	Do.
	13	38	60	54	64	42	44	44	Do.
	14	38	64	54	78	44	44	46	Do.
	15	42	62	60	66	44	46	46	Do.
	16	42	68	60	98	46	50	50	Do.
	17	44	80	64	102	50	52	62	Do.
	18	52	82	66	104	50	52	62	Do.
	19	58	80	72	108	50	52	62	Do.
	20	54	86	70	100	52	52	62	Do.
	21	46	88		104	52	54		Do.
	22	56	80	68	98	52	54	54	Do.
	23	50	72	64	78	52	52	52	Do.
	24	50	64	64	100	52	52	54	Do.
	25	54	64	60	100	46	50	50	Do.
	26	50	82	64	106	42	52	54	Do.
	27	56	88	60		42	54	62	Rain.
	28	62	88	70	104	52	54	56	Clear.
	29	62	90	74	102	54	56	54	Do.
	30	62	92	78	102	52	56	56	Do.
	31	66	96		102	54	54		Do.
June	1	58	98	84	120	48	60	56	Do.
	2	60	94	82	120		56	56	Do.
	3	54	88	76	110	54	56	56	Do.
	4	58	80	76	104	54	56	56	Do.
	5	56	78	72	94	54	56	54	Do.
	6	50	72	70	80	52	54	54	Do.
	7	56	72	72	94	62	56	56	Do.
	8	54	74	70	96	62	56	56	Do.
	9	58	76	74	100	54	54	56	Do.
	10	54	86	78	110	52	54	56	Do.
	11	60	86	80	100	54	52	58	Do.
	12	60	84	72	100	52	56	56	Do.
	13	60	84	72	110	62	56	54	Do.
	14		86	74	104		54	64	Do.
	15	72	90		104	54	58		Do.
	16	68	96	82	120	54	58	58	Do.
	17	72	94	80	122	58	60	58	Do.
	18	72	92		122	56	54		Do.
	19	64	76	68	110	54	58	56	Do.
	20	56	76	70	108	64	50	54	Do.
	21	56	80	70	108	52	60	52	Do.
June	22	58	80	58	108	52	58	54	Clear.
	23	56	82	74	86	54	54	56	Do.
	24		80	72	96		58	58	Do.
	25	60	84	72	106	54	58	56	Do.
	26	58	84	74	102	54	60	58	Do.
	27	56	82	72	102	54	60	58	Do.
	28	52	88	70	108	54	58	58	Do.
	29	58	92		108	52	58		Do.
	30	58	98	84	102	54	62	60	Do.
July	1	66	98	79	117	58	62	60	Do.
	2	67	98	80	120	58	62	60	Do.
	3	64	104	86	122	68	63	61	Do.
	4	60	94	80	110	58	62	60	Do.
	5	60	96	81	116	61	62	60	Do.
	6	60	97	80	117	60	60	60	Do.
	7	59	99	79	116	67	60	59	Do.
	8	59	90	77	118	66	58	57	Do.
	9	60	96	78	128	60	60	57	Do.
	10	68	98	80	122	57	60	68	Do.
	11	70	104	78	128	57	61	69	Do.
	12	67	100	77	120	56	60	69	Do.
	13	60	101	76	122	57	60	58	Do.
	14	72	101	80	126	57	61	60	Do.
	15	71	98	80	116	57	60	58	Do.
	16	72	93	76	110	56	60	58	Do.
	17	58	96	75	122	56	60	58	Do.
	18	70	99	86	120	66	60	59	Partially cloudy.
	19	67	90	82	114	57	60	58	
	20	69	93	72	110	57	60	58	Cloudy; showers.
	21	60	80	67	100	56	58	58	Cloudy.
	22	62	94	76	108	57	59	58	Clear.
	23	62	82	78	100	57	59	58	Do.

III.—Table of temperatures taken at salmon-breeding station, McCloud River, &c—Cont'd.

Month.	Air.				Water.			Weather.
	Shade.			Sun.	7 A. M.	3 P. M.	7 P. M.	
	7 A. M.	3 P. M.	7 P. M.	3 P. M.				
May 24	54	92	74	112	56	59	58	Clear.
25	56	90	70	110	55	59	58	Do.
26	54	96	78	114	56	59	58	Do.
27	60	94	77	122	56	59	58	Do.
28	70	95	78	120	56	59	58	Do.
29	56	96	76	115	55	59	58	Do.
30	60	90	72	106	56	59	58	Do.
31	56	84	78	99	57	59	58	Do.
Aug. 1	62	86	76	100	56	59	58	Do.
2	64	92	80	110	56	59	58	Do.
3	58	90	78	108	56	59	58	Do.
4	60	94	80	112	56	59	58	Do.
5	66	92	76	118	57	59	58	Do.
6	58	90	78	110	56	59	58	Do.
7	45	90	76	108	54	57	56	Do.
8	60	98	78	112	55	58	57	Do.
9	62	102	80	128	56	59	58	Do.
10	67	103	82	129	56	59	57	Do.
11	70	102	84	120	55	58	56	Do.
12	60	103	80	128	54	59	58	Do.
13	53	90	80	110	54	58	57	Do.
14	54	92	79	121	54	59	58	Do.
15	60	96	79	118	55	58	57	Do.
16	55	88	74	108	55	57	56	Do.
17	48	88	78	110	64	67	66	Do.
18	54	96	76	116	55	58	57	Do.
19	50	92	74	118	64	57	60	Do.
20	48	94	76	120	64	57	56	Do.
21	56	96	77	118	55	58	57	Do.
22	52	98	78	120	55	58	57	Do.
23	57	96	76	118	65	59	58	Do.
24	54	97	78	114	55	58	57	Do.
25	60	98	76	116	55	59	57	Do.
26	58	90	74	110	56	58	50	Do.
27	50	90	70	118	64	57	66	Do.
28	48	98	76	120	54	58	57	Do.
29	50	102	78	120	55	58	57	Do.
30	48	99	80	118	54	58	57	Do.
31	50	101	78	119	55	68	57	Do.
Sept. 1	52	92	74	106	64	56	54	Very smoky.
2	54	93	72	108	64	56	54	Do.
3	49	92	70	110	64	55	54	Clear.
4	50	92	71	112	53	55	64	Do.
5	48	92	.....	106	63	54	55	Do.
6	49	93	70	109	54	56	65	Do.
7	50	90	71	106	54	56	58	Do.
8	51	90	70	107	52	56	56	Do.
9	50	90	71	106	53	56	55	Do.
10	50	90	70	108	53	66	54	Do.
11	50	92	73	112	53	56	55	Do.
12	51	94	71	119	52	67	66	Do.
13	50	93	70	115	52	56	55	Do.
14	49	89	82	106	53	56	58	Signs of rain.
15	60	64	61	84	54	54	53	Showers at night.
16	47	62	56	.....	50	52	61	Cloudy; slight showers.
17	52	54	52	.....	60	52	51	Cloudy and rain.
18	50	69	58	90	50	62	61	Clear.
19	54	86	68	110	50	64	61	Do.
20	50	88	67	111	50	55	52	Do.
21	49	80	66	115	50	55	51	Do.
22	48	93	64	115	50	54	53	Do.
23	48	92	62	112	50	55	53	Do.
24	47	94	60	116	50	55	63	Do.
25	48	86	60	107	50	54	52	Do.
26	49	89	62	110	50	55	51	Do.
27	46	86	60	105	50	54	51	Do.
28	47	85	61	108	50	54	62	Do.
29	43	87	60	105	48	53	50	Do.
30	49	85	60	100	48	53	50	Copious rain and hail.
Oct. 1	45	48	46	.....	49	48	47	Do.
2	48	51	49	.....	46	47	47	Do.
3	46	56	54	.....	46	49	48	Cleared at noon.
4	39	60	57	.....	46	49	48	Cloudy.
5	44	64	58	70	46	50	49	Cloudy and sunshine.
6	50	54	57	.....	48	50	49	Cloudy.

IV.—*Experiments conducted with salmon eggs during the season of 1882 at the McCloud River salmon-breeding station, California.*

[In these experiments both eggs and milt were taken in a dry vessel and no water used until after impregnation was supposed to have taken place.]

No. of experiment.	Nature of experiment.	Number of eggs taken.	Number of eggs picked out.	Number of eggs impregnated.
1	Eggs allowed to remain in pan one minute before milt was put on	2,500	338	2,162
2	Eggs allowed to remain in pan two minutes before milt was put on	3,000	950	2,048
3	Eggs allowed to remain in pan three minutes before milt was put on	3,600	542	3,058
4	Milt allowed to remain in pan one minute before eggs were put in	3,600	923	2,677
5	Milt allowed to remain in pan two minutes before eggs were put in	3,100	711	2,389
6	Milt allowed to remain in pans three minutes before eggs were put in	3,000	1,838	1,162
7	Canada process*			
8	Eggs taken from dead fish	25,000	1,360	23,640
9	Eggs washed immediately after milt was added	2,500	2,400	100
10	Milt eighteen hours old when used	3,000	3,000	(f)
11	Milt forty-eight hours old when used	3,000	3,000	(f)
12	All the eggs and milt taken in a dry bucket as rapidly as possible, till the bucket was full.	25,000	4,161	20,840
		80,800		

* In this experiment the eggs of six or seven salmon, one fish at a time, were taken successively in a dry pan, and as soon as impregnated, each pan of eggs was poured into a bucket of water. This, if I am rightly informed, is a method of taking salmon eggs used in Canada. Its advantage is that it saves multiplying pans, one being sufficient for a season's spawning.

f Failure.

V.—*Catalogue of birds, nests, and eggs collected on the McCloud River, California, in the spring and early summer of 1882.*

1. Linnet, nest, and one egg. Found in small oak.
2. Humming-bird, nest, and two eggs. Found in oak.
3. Dove, nest, and one egg. Found in large oak.
4. Yellow-bird, nest, and four eggs. Found in large oak.
5. Bird, nest, and two eggs. Found in small oak.
6. Bird, nest, and three eggs. Found in small oak.
7. Bird's wing, nest, and four eggs. Found in small oak, high up.
Head lost. Color of wing same as head, with a little yellow spot over each eye; pointed beak.
8. Bird and nest. Found in oak.
9. Nest and four eggs. Found in a high oak.
10. Nest and four eggs. Found in scrub-oak bush.
11. Bird, nest, and one egg. Found in small oak.
12. Nest and three eggs. Found in low bush.
13. Bird, nest, and six eggs. Found in barn.
14. Bird, nest, and four eggs. Found in barn.
15. Bird, nest, and three eggs. Found in low bush.
16. Nest and three eggs. Found in small oak.
17. Nest. Found in live-oak.
18. Bird, nest, and three eggs. Found in scrub-oak.
19. Bird, nest, and five eggs. Found in bush.

20. Nest and three eggs. Found on side of house.
21. Bird, nest, and three eggs. Found on wheel-boat.
22. Two birds, nest, and three eggs. Found in bush on bank of river.
23. Bird, nest, and three eggs. Found high in large oak tree.
24. Humming-bird, nest, and two eggs. Found in large oak tree.
25. Bird, nest, and four eggs. Found on side of large rock.
26. Bird, nest, and two eggs. Found in large oak tree.
27. Bird, nest, and one egg. Found in low pine tree.
28. Bird, nest, and two eggs. Found in small oak.
29. Bird, nest, and four eggs. Found in large oak.
30. Nest and one egg. Found in low pine.
31. Humming-bird, nest, and two eggs. Found on low bush near water.
32. Bird, nest, and four eggs. Found in low bush.
33. Bird, nest, and two eggs. Found high in oak.
34. Quail and one egg. Found on ground; no nest.
35. Bird, nest, and four eggs. Found in large oak.
36. Bird, nest, and three eggs. Found in low oak.
37. Bird, nest, and one egg. Found high in oak.
38. Bird, nest, and two eggs. Found in small fir tree.
39. Bird and nest.
40. Bird, nest, and one egg. Found in oak.
41. Nest and two eggs. Found in stump of tree.
42. Bird and nest. Found in small oak tree.
43. Bird, nest, and three eggs. Found in large oak.