

IX.—REPORT OF OPERATIONS AT THE TROUT-BREEDING STATION ON THE M'CLOUD RIVER, CALIFORNIA, DURING THE SEASON OF 1884.

By LIVINGSTON STONE

The date of the beginning of the spawning season at the trout ponds seems to recede a little every year. This season, the firstripe fish were found on the 28th of December, when 12,300 eggs were taken from 16 trout. The spawning continued till the 28th of May, when 8,000 eggs were taken from 10 trout. Mr. Loren W. Green, who has charge of this station, reports that there were still many unripe females at that time which had not spawned, and which he had to turn back to the ponds because no more ripe males could be obtained, the spawning season for the males being entirely over. Mr. Green also reports that there was something very unusual in the way in which the spawning females turned out this season; their eggs not only seemed to be very slow in maturing in the parent, but they were also few in number, small and poorly developed when ripened. The average number of eggs to the fish was at least 200 less than in former years. The observations of Mr. Green were confirmed by the experience of Mr. J. B. Campbell, who has been engaged in the culture of trout, more or less, for the last eight years. Mr. Campbell writes, under date of May 17, 1884, that there has never been such a season on the river since he took up trout culture there eight years ago. The trout, he says, did not yield the usual number of eggs, and they acted strangely in running up the small streams many days before they were ready to spawn. Mr. Green attributes much of this unusual conduct on the part of the trout to scarcity of food in the river during the fall. The thousands of salmon which annually die in the river at their spawning season, and then sink to the bottom, furnish, strangely enough, much of the food of the trout at that season, besides vastly increasing the amount of low forms of aquatic animal life in the river, which also furnish food for the trout later on. This year, very few salmon came up the river, owing to the blasting operations of the railroad construction corps, near the mouth of Pitt River, and the natural food supply of the McCloud River trout was consequently very much diminished. I think Mr. Green is correct in connecting the peculiar conduct of the parent trout with this diminution of the food supply,

though other causes, perhaps now unknown, probably complicated the matter and contributed to produce the general effect.

During the latter part of January there was a very heavy fall of rain, such a rain-storm, indeed, as I suppose is encountered only in mountainous regions like this. The McCloud River rose rapidly, the mud poured down the trout-pond creek, and, although Mr. Green was at work to protect them two entire nights, 35,000 trout eggs in the hatching-troughs were killed by the excess of mud in the water. The storm is described as a terrific one, and did some other damage about the station, which, however, was soon repaired.

After the storm, the season proved as usual, with the exception of the peculiarities above mentioned of the spawning trout. Notwithstanding the difficulties which had to be contended with this year, upward of 315,000 trout eggs were taken, most of which were sent to the States of the Atlantic Slope, though some were given to the California Fish Commission, some hatched and returned to the McCloud River, and some hatched and kept to be reared at the station.

Below will be found notes from Mr. Green's diary, and tables of statistics, as follows :

- (a) Table giving daily number of fish spawned and eggs taken.
- (b) Table showing the distribution of the eggs taken.
- (c) Table giving temperatures of air and water.

CHARLESTOWN, N. H., October 30, 1884.

NOTES FROM DIARY OF MR. LOREN W. GREEN, SUPERINTENDENT OF McCLOUD RIVER TROUT-BREEDING STATION, CALIFORNIA, EXTENDING FROM DECEMBER 23, 1883, TO APRIL 18, 1884.

Dec. 23. Rain and snow all day.

24. Raining all day; river rising.

25. Raining hard all day, water 2 feet high.

26. Raining all day, water about the same. Snow on mountains.

27. Went over fish in the upper pond to-day. Got 10 ripe females. Raining hard. Fish commenced to spawn.

28. Raining hard all day. No ripe fish.

29. No ripe fish. No rain, but cloudy.

30. No ripe fish. A few fish ran up race, but no ripe ones.

31. Forty-nine fish ran up the race. Not one ripe or showing any signs of spawning.

Jan. 1. Ten trout ran up race. Two ripe females and one ripe male.

2. A few fish ran up. No ripe ones.

3. No ripe fish.

4. No ripe fish.

5. Heavy rain all day.

6. Went over fish in lower pond—got several ripe females, and found 40 females spawned out; fish spawning very few eggs.

7. Raining hard all day. Put trap in Hirtz Creek this evening.

8. Raining hard all day; finished trap at Hirtz Creek.

9. Caught 3 trout in trap; clear and cool.

10. No trout in traps; freezing hard to-night.

- Jan. 11. No trout in traps; clear and cool.
 12. Freezing hard nights; no fish.
 13. Weather cold and clear; no fish.
 14. Weather cold and clear; no fish.
 15. Weather cold and clear; no fish.
 16. Weather cold and clear; no fish.
 17. Took out trap and closed up race.
 18. Weather cool and clear.
 19. Weather cloudy.
 20. Weather cloudy and cold.
 21. Weather cloudy and warm.
 22. Weather cloudy and warm.
 23. Water in creek very low; no fish.
 24. Weather cool and clear; trout spawning very poorly.
 25. Shipped eggs; weather clear and cool.
 26. Raining hard all day.
 27. Raining hard all day; creek very high and muddy to-night.
 28. Raining hard; heavy land-slide up the creek; ponds filling with mud very fast, and eggs dying very fast.
 29. Ground covered with snow; water clearer. Latest eggs taken nearly all dead; those a week old all right and alive; those dead were one day old before the muddy water.
 30. Weather clear and warmer; water clearing up fast; water in river very high.
 31. Fish-traps all washed away; weather clear and water falling; eggs doing well.
- Feb. 1. Put traps back in the creek to-day. Caught 2 trout this evening.
 2. Caught 2 trout in trap; sent Indians up to Wye-te-Wouet to put in trap to-day.
 3. Caught 2 trout in traps; weather cloudy and unsettled.
 4. Caught 7 trout in traps. Forenoon showery; evening clear and cold.
 5. Caught 1 trout; heavy snow-storm.
 6. Very cold. Water falling fast.
 7. Eggs doing well; very cold, thermometer at 6 p. m. 20° above zero.
 8. Very cold. Eggs advancing very slowly; eggs twenty days old showing no eye spots.
 9. Very cold.
 10. Sunday very cold. Eggs advancing very slowly. Clear and pleasant.
 11. Sent Indians to Chattedouchekilles to put in wood trap in creek.
 12. Weather very cold. No fish running.
 13. Went to Big Creek, but no fish.
 14. Packed in some ice; very thin and poor.
 15. Snow 8 inches deep, and very cold.
 16. Raining hard all day. Caught 3 trout.
 17. Raining hard; water raising very fast. Caught 10 trout.
 18. Raining hard; water very high and muddy; traps washed away. No trout to-day.
 19. Weather colder; snowing very hard, water very high and muddy; snow 10 inches deep here on the river and still snowing.
 20. Snowing hard in morning, evening clear and sun shining brightly; water falling.
 21. Weather clear and warmer; water at a standstill; mud 8 inches deep in pond.
 22. Clear and warm; no fish.
 23. Water falling fast; no fish running.
 24. Packed and shipped 18,000 eggs to Washington.

Feb. 25. Weather clear and warm.

26. Went up the river to traps; no fish.

27. Fish spawning very slowly, and very few eggs.

28. Caught 3 trout; clear and warm.

29. Clear and warm.

Mar. 1. Clear and warm.

2. Tuesday, shipped eggs to Washington.

3. Weather cloudy and warm.

4. Weather cloudy and warm.

5. Raining hard all day; water rising very fast and very muddy.

6. Raining hard in forenoon; afternoon clear, and evening very cold; fish advancing very slowly.

7. Very cloudy and warm.

8. Raining hard all day; warm.

9. Raining very hard all day; water very high and muddy; eggs covered with mud. We are washing them every 15 minutes; they are doing well so far.

10. Clear and warm; water falling a little.

12. Clear and warm; water falling a little.

13. Weather very dark and cloudy.

14. Raining all day.

15. Weather cloudy; heavy showers in evening.

16. Weather very dark and cloudy.

17. Raining hard all day.

18. Weather clear and cool; trout spawning very badly and eating freely.

19. Picked out trout for Fulton market exhibition.

20. Fish act very strangely—spawning very slowly, and very few eggs.

21. Went to Redding and shipped trout to New York; weather showery.

22. Raining hard all day.

23. Clear and cold.

24. Very cloudy; raining in evening.

25. Raining hard all day; very cool.

26. Misty and dark; weather cool.

27. Snowing hard all day; very cold; 8 inches of snow this evening.

28. Raining hard all day; water high.

29. Snow all gone and clear.

30. Went over fish. They seem no nearer spawning than 4 weeks ago; are acting very strangely.

31. Clear all day; cloudy in evening.

April 1. Raining hard all day.

2. Raining hard all day.

3. Clear and cool.

4. Caught 6 trout up at Chattedouchekilles.

5. Male trout all ripe; females not ripe.

6. Weather clear. Caught 14 trout in trap up at Chattedouchekilles.

7. Caught 8 trout.

8. Caught 20 trout.

9. Raining hard all day; trout all running over trap.

10. Raining hard all day.

11. Raining hard, and water very high.

12. Raining hard; creeks just booming.

13. Raining hard all day.

14. Raining hard all day.

15. Raining forenoon; afternoon clear.

16. Water falling fast; ponds filled about 12 inches with mud.

17. Weather clear and warm.

18. Weather clear and warm.

Daily record of trout eggs taken at the McCloud River Station, California, during the season of 1883-'84.

Date.	No. of females.	No. of eggs.	Date.	No. of females.	No. of eggs.	Date.	No. of females.	No. of eggs.
1883.			1884.			1884.		
Dec. 28	16	12,300	Feb. 16	15	11,075	Apr. 30	4	3,000
1884.			15	13	8,500	May 2	7	4,300
Jan. 3	17	12,200	23	29	20,200	6	8	4,100
9	14	11,050	Mar. 3	3	2,000	9	12	8,000
11	20	15,100	9	21	16,300	13	10	7,000
14	10	8,500	15	8	0,000	May 20	13	10,000
17	5	3,000	23	8	4,500	22	12	9,000
19	3	2,500	29	10	7,000	24	15	12,000
24	21	16,200	Apr. 9	6	3,700	25	7	5,500
Feb. 28	40	35,000	12	17	13,000	28	10	8,000
3	24	18,100	14	13	8,100			
5	5	5,000	20	8	5,000			
								315,225

Distribution of trout eggs from McCloud River Station, California, during the season of 1884.

Date.	Distribution made.	No. of eggs.
Jan. 25	Mr. R. O. Sweeny, Saint Paul, Minn.	12,000
20	Mr. B. F. Shaw, Anamosa, Iowa.	12,000
20	B. E. B. Kennedy, Omaha, Nebr.	11,000
31	Col. M. McDonald, Washington, D. C.	15,000
Feb. 18	do.	30,000
23	do.	18,000
Mar. 1	do.	16,000
15	do.	8,000
15	do.	20,000
29	do.	18,000
Apr. 27	Shepley Hatchery (on Narrow-Gauge Railroad, between Colfax and Grass Valley.	21,000
May 15	do.	12,000
22	do.	12,000
	Hatched and kept to be reared at station.	21,200
	Hatched and turned into McCloud River.	51,500
	Destroyed by storms and other causes.	58,525
	Total.	315,225

Table giving temperatures of air and water at noon at the McCloud River Trout-breeding Station, California, from August 13, 1883, to April 30, 1884.

Day of month.		Aug., 1883.		Sept., 1883.		Oct., 1883.		Nov., 1883.		Dec., 1883.		Jan., 1884.		Feb., 1884.		Mar., 1884.		Apr., 1884.	
		Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.
1.		o		o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
2.				88	60	60	58	60	52	54	48	48	48	48	48	60	49	64	51
3.				00	62	68	58	64	52	54	48	50	48	48	48	60	50	68	51
4.				02	62	62	58	64	52	54	48	54	48	50	48	62	50	68	51
5.				04	61	60	57	60	52	55	48	54	48	48	48	54	50	68	51
6.				02	60	60	56	60	52	56	48	50	48	44	48	60	51	68	52
7.				06	61	60	54	60	51	50	48	48	48	44	48	50	51	68	52
8.				00	62	62	54	58	51	48	48	54	48	38	47	48	51	70	52
9.				08	62	66	54	56	51	58	48	54	50	40	47	58	51	70	52
10.				08	61	70	54	60	51	58	48	50	40	42	46	52	51	68	52
11.				85	60	75	54	62	51	60	48	60	49	28	45	52	50	60	52
12.				84	50	76	55	64	52	54	48	52	49	30	44	50	50	60	52
13.				84	59	76	56	70	52	56	48	52	48	32	45	54	50	60	52
14.				00	60	59	76	56	71	52	60	48	53	48	40	45	50	62	52
				82	60	80	60	66	70	63	64	48	54	48	40	40	40	52	52

Table giving temperature of air and water, &c.—Continued.

Day of month.	Aug., 1883.		Sept., 1883.		Oct., 1883.		Nov., 1883.		Dec., 1883.		Jan., 1884.		Feb., 1884.		Mar., 1884.		Apr., 1884.	
	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.	Air.	Water.
15.	80	60	88	60	80	56	74	53	66	48	58	48	42	46	40	60	52	52
16.	84	60	86	58	76	54	66	52	72	48	60	40	36	46	.....	76	52	52
17.	92	61	85	59	60	54	62	52	68	48	50	49	36	46	62	50	78	53
18.	92	62	84	60	58	54	64	52	68	48	52	49	40	47	62	50	78	53
19.	96	62	92	60	56	54	60	52	66	48	54	49	48	47	70	51	80	53
20.	95	62	100	60	60	54	58	51	60	48	56	50	50	48	70	51	78	53
21.	94	62	100	60	60	54	60	51	50	48	58	50	55	48	66	50	88	54
22.	88	61	98	60	60	54	62	51	47	60	50	50	68	48	60	49	64	54
23.	82	61	96	60	58	53	58	51	48	47	62	50	72	48	48	40	60	55
24.	86	60	95	60	54	53	48	50	48	47	68	50	72	48	48	40	60	55
25.	83	60	88	60	52	53	46	49	48	47	66	50	72	48	48	40	60	55
26.	100	60	80	50	48	52	50	49	48	47	68	50	78	48	48	40	60	55
27.	98	82	82	59	44	52	56	48	50	48	48	50	76	48	38	48	00	55
28.	88	64	80	59	46	52	60	48	50	48	46	50	75	48	40	49	70	55
29.	90	64	80	58	52	52	60	48	40	48	46	48	73	48	45	50	70	55
30.	88	63	70	58	60	52	56	48	46	48	50	48	.....	.....	55	50	86	55
31.	86	62	.....	.....	64	62	.....	.....	48	48	50	48	.....	.....	64	50	.....	.....