

XXX.—REPORT OF OPERATIONS AT THE TROUT-BREEDING STATION OF THE UNITED STATES FISH COMMISSION ON THE M'CLOUD RIVER, CALIFORNIA, DURING THE YEAR 1882.

BY LIVINGSTON STONE.

When my last report closed, December 31, 1881, everything was going on well at the trout ponds. There had been no recurrence of the extreme high water of last year, and, though it had been unusually cold, it had not been very rainy; and no trouble had been caused, as in the previous winter, by the heavy rains washing down mud into the creek from above.

The trout were already showing signs of preparing to cast their spawn when the year opened, and on the 5th of January the first eggs were taken, to the number of about 50,000. The taking of eggs continued till the 5th of May, when the last lot was placed in the hatching troughs. Some spawning fish were left in the ponds, but for some reason were very slow in getting ripe, and some of them did not deposit their eggs till August. The winter was very cold, and the temperature of the water in which the eggs were hatched became so low that they were twelve days longer in showing the eye-spots than they were last year. Still water, in hollow places in the rocks, froze to the thickness of eight inches, indicating a degree of cold unprecedented on the McCloud River since white men first visited it.

As has been noticed heretofore, the smaller females, presumably the youngest fish, spawned first, the larger and older ones all coming on later. Also, as in previous years, the spawning females that were bright and plump and in best condition gave the smallest eggs, other things being equal, while the thin and lean-looking gave the largest; the general rule prevailing, however, throughout, that the larger the fish, the greater the size of the eggs.

The eggs varied in size and complexion this season as much as ever, some of them being almost if not fully as large as the smaller salmon eggs, while others were not much if any larger than those of the eastern brook trout, *Salvelinus fontinalis*. The color of the eggs varied, too, as usual, ranging from the almost blood-red of the salmon eggs to a light straw color. No peculiarity about the looks of the ripe female trout could be observed that was constant, except the shape of the abdomen distended by its burden of full-grown eggs. Some of the ripe fish were black and dirty looking, others were bright and fresh looking; some

had the red band strongly marked, others had not a trace of it. Consequently one cannot tell by the looks of the trout whether it is ripe or not. To ascertain this every fish must be tried and examined separately by hand.

On the whole, the spawning season was quite successful, and over 337,000 trout eggs were taken and distributed from this station in the present year.

The eggs, after being packed, are carried on horses to the salmon-breeding station, 4 miles down the McCloud River, and from there are taken to Redding, California, 22 miles farther, by stage. From Redding they are shipped by rail for 3,000 miles or more, as the case may be, to their eastern destination. It is wonderful that any of them arrive at the end of their long journey in good order, but some lots opened at their journey's end in excellent condition, as may be seen by the following letters:

[I.—From FRANK N. CLARK, Northville, Mich., February 8, 1882.]

The eggs of California trout which you shipped from Redding on the 25th of January came to hand on the 2d instant, and were in very fine condition. The ice was not all gone, a chunk remaining that would weigh, I should judge, 10 or 15 pounds. After unpacking we picked out 615 dead eggs, and since then 685, or about 1,300 all told.

[II.—From FRANK N. CLARK, Northville, Mich., March 3, 1882.]

The second lot of California trout eggs came to hand on the 14th of February, and were in excellent shape.

On unpacking we picked out only 272 dead eggs, and since then 384 more, or 656 altogether, which represents almost the entire loss, as they are now hatching very freely.

This was an unexceptionally fine lot of eggs, and they were packed in a superior manner, and appear to have been handled with due care while in transit.

[III.—From E. M. STILLWELL, Bangor, Me., April 25, 1882.]

The trout eggs (10,000) arrived here Sunday morning, April 23, and were sent up to our hatching-house at Enfield yesterday morning, unpacked, and placed in the hatching-troughs. They were in excellent condition, there being but 80 bad eggs in the whole lot.

[IV.—From WILLIAM GRIFFITH, fish commissioner of Kentucky, Louisville, Ky., April 23, 1882.]

In reply to your favor of 13th instant, allow me to say that 5,000 McCloud River trout eggs were received April 13, at 10 a. m.; unpacked at 12 m. One pound of ice on eggs. Eggs in good condition. Number of bad eggs when unpacked, 316.

[V.—From W. E. SISTRUP, fish commissioner, Idaho Springs, Colo., May 3, 1882.]

I received 10,000 California trout eggs on the 23d of April, and found, upon opening them and placing them in the hatching-troughs, that they were in very good condition. I will be pleased to report to you the success I have in hatching them.

Very few fish have been lost by death this year. Even during the spawning season but a small percentage died. Mr. Myron Green, who has charge of the ponds, says that the trout recuperate very rapidly indeed after spawning, and that many which were weak and thin and apparently past recovery when spawned became in a few weeks as well and handsome as ever.

There are now in the ponds about 2,000 trout, the smallest of which weighs 2 pounds or perhaps 1½ pounds, and the largest not far from 10 pounds. The average size is about 3 pounds, making a total weight in the ponds of 6,000 pounds of trout.

In order to keep the fish safe the ponds have to be watched very carefully. Wild cats, lynxes, coons, otters, and minks are very numerous about the ponds, the wild cats and lynxes being the boldest and most destructive to the fish. Notwithstanding the reputation which the cat has had from time immemorial of being disinclined to wet its feet, the wild cats (*Lynx rufus*) and lynxes (*Lynx canadensis*) here, Mr. Green says, will even jump into the ponds in their eagerness to get the trout. I might add that the panthers (*Felis concolor*) have become recently very bold and very numerous in this vicinity. In September of this last year while I was there a large panther came down three nights in succession close to the house of a settler, who lives across the river from the salmon fishery, and carried away several pigs. One also sprang close behind Mr. Myron Green one evening last spring, when he was going home, and caught his dog. It is estimated that the panthers have killed twenty-five hogs on the other side of the river this year, besides many calves, colts, and even full-grown cattle. They have never yet been known, however, to kill the fish in the trout ponds.

Before closing, allow me to say a few words regarding the question whether there is more than one variety of black-spotted trout in the McCloud River. It is settled definitely that the McCloud River contains *Salmo irideus*, the coarse-scaled trout of the McCloud River proper, which grows to a weight of 8 or 10 pounds, has an obtuse nose and large eyes, with bright red gill-covers and a broad red band along its body. We know that this fish is in the McCloud River, for there are hundreds, thousands, indeed, in the ponds of the United States Fish Commission on the McCloud, which have been caught in the river and placed in these ponds from time to time. The question remains, is there another kind of black-spotted trout in the ponds or in the McCloud River finer scaled and differently shaped? With special reference to this question I took a day to examine the trout in the United States ponds on the McCloud

River. These fish, two or three tons in all, were caught in the river and tributaries, and all, or nearly all, are above 2 pounds in weight, and probably all are over two years old.

After a thorough examination of the fish, both alive and dead, I am compelled to give it as my opinion, which I admit is not based on a scientific study of them, that there is only one variety of black-spotted trout in the United States ponds on the McCloud River, or that if there are two or more varieties, they shade into each other by imperceptible degrees.

It is the opinion of Mr. Myron Green and Mr. Loren Green, who have had more experience with these fish than any other white men, that there is only one variety of trout in the United States trout ponds and in the McCloud river, or, if there are more, that they breed together indefinitely, so that all specific characteristics of distinct varieties, if there were any, have become lost.

One thing is certain, which is that if there are two or more species of trout in the ponds, the eggs distributed from these ponds are the fruit of an intermixture of both or all the varieties, for the males and females in the ponds are used indiscriminately in the spawning season, and all seem to be equally efficient in producing fertilized ova.

The only distinction which the writer could discover between the so-called fine-scaled and the coarse-scaled varieties was simply this, viz: that the larger fish in the river were coarse-scaled and the smaller fish in the brooks which flow into the river were fine-scaled. This holds true universally. It is the general opinion on the river (which opinion the writer shares) that the trout in the river are the same variety as the trout in the brooks, but that the younger and smaller trout affect the brooks, and the larger and older ones prefer the river. According to the generally received nomenclature in the Eastern States, I suppose the brook trout would be called the fine-scaled or mountain trout (*Salmo clarkii*?) and the coarse-scaled or river fish would be called the McCloud River trout, rainbow trout, or *Salmo irideus*. I confess the subject is very much of a puzzle to me still, particularly because persons who have hatched the California trout eggs and have raised the fish from them, are very positive that what are called the California mountain trout and what are called the California McCloud river trout are two distinct varieties; while, according to the theory just presented, they ought to be both the same variety. Mr. Roosevelt speaks very decidedly about it, and says that "the distinctions between the McCloud River and the mountain trout are quite apparent to the eye;" that "there is some difference in their habits"; that the mountain trout does not grow to more than half the size of the McCloud River trout, and that when cooked there is a marked superiority in favor of the mountain variety. This, I believe, is also Seth Green's opinion. Now, if this is all true, and I do not here dispute it, how does it happen that we have only one kind of trout in the ponds of the United States Fish Commis-

sion on the McCloud River? Our trout there have been taken indiscriminately from brook and river, and if there are two distinct varieties in the river and its tributaries, it seems impossible that both varieties should not be represented among the thousands of trout in the ponds, but they are not. Unless appearances are very deceptive, the ponds contain but one variety of trout.

Leaving this subject here for the present, I will merely add in conclusion that a large number of wild breeders have been caught in the river during the last year and placed in the ponds; that all the trout are now in fine condition, and that there is a flattering prospect of taking an excellent lot of eggs during the next spawning season, which promises to come on very soon.

Table showing the number of trout (Salmo irideus) eggs distributed in 1882 from the United States trout-breeding station on the McCloud River, California.

Date.	Destination.	No. of eggs shipped.
Jan. 25	F. N. Clark, Michigan	55,000
Feb. 5	do	40,000
20	Central hatching-station, Washington, D. C.	15,000
Mar. 2	do	18,000
19	E. G. Blackford, New York	20,000
15	R. O. Sweeney, Michigan	5,000
28	M. F. Bailey, Wisconsin	10,000
28	Seth Weeks, Pennsylvania	10,000
28	Calvin Fletcher, Indiana	5,000
Apr. 5	C. H. Brownell, Missouri	10,000
5	J. G. Portman, Michigan	5,000
5	Peter Walsh, Colorado	5,000
5	Calvin Fletcher, Indiana	5,000
13	E. M. Stillwell, Maine	5,000
13	William Griffith, Kentucky	10,000
13	W. E. Sisty, Colorado	10,000
13	B. F. Shaw, Iowa	5,000
14	E. A. Brackett, Massachusetts	1,000
14	D. D. Long, Kansas	10,000
19	H. J. Fenton, Connecticut	5,000
22	C. H. Barber, Vermont	5,500
24	B. B. Redding, California	10,000
28	E. G. Blackford, New York	10,000
May 4	B. B. Redding, California	5,000
6	do	10,000
9	N. K. Fairbanks, Illinois	10,000
9	Mrs. Slack, Illinois	4,000
12	C. S. White, Illinois	4,000
12	A. Powers, Illinois	10,000
15	B. B. Redding, California	10,000
	Eggs hatched and planted in the McCloud River during the season	10,000
	Total	837,500