

XXV.—REPORT OF OPERATIONS AT THE UNITED STATES TROUT-BREEDING STATION ON THE McCLOUD RIVER, CALIFORNIA, DURING THE YEAR 1883.

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By LIVINGSTON STONE.

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The year opened on the McCloud River with unusually cold and clear weather, in consequence of which both the river and the trout-pond creek were at a very low stage of water. As, however, there is water enough for the trout-ponds, and much to spare even in the hottest and driest time in midsummer, the condition of the creek on this New Year's was by no means unfavorable, but, on the contrary, much more desirable than the opposite state of affairs, which sometimes prevails at this season, when the river is high and the creek is booming and mud is being washed down into the trout-ponds in quantities that are dangerous to the health of the fish.

The trout in the ponds on the 1st of January were in splendid condition. There were between 2,000 and 3,000, and their average weight was about 2½ pounds. They showed signs of spawning earlier this year than in previous years, and on the third day of January the first eggs were taken, to the number of 25,000. The spawning season, although coming several days earlier than in previous years, seemed to have fully set in, because on January 4th 28,000 more eggs were taken, and on the 5th 25,500 were taken.

At the close of the report will be found a table showing the daily number of eggs taken during the season.

This year the spawning of the fish was particularly severe on the men who handled them, owing to the very cold weather that prevailed during the spawning months. This cold weather was unusual even for this locality. It will be remembered, however, that unusual cold weather prevailed over the whole western coast during the winter of 1882-'83, and that at San Francisco the greatest and indeed almost the only snow-storm deserving the name since California was settled occurred during that winter.

When very cold weather is spoken of on the Pacific coast it is not, of course, anything like the extreme cold of the same latitudes on the Atlantic coast that is meant. Indeed, a resident of the Atlantic slope of the United States would be rather amused to hear even the most

frigid winter weather of the Pacific slope described as extremely cold, or even moderately cold. Nevertheless, the nature of the Western cold is such that, although it does not have the contracting effect on inanimate objects—the mercury of the thermometer included—it is often less endurable than the more intense Eastern cold. For example, a person will often suffer more from cold in driving for an hour or two along the coast line near San Francisco in August, when the thermometer hardly stands below 55° F., than one would, with similar clothing, in the interior of New England on a frosty morning with the thermometer thirty degrees lower. In consequence of this peculiarity of the cold weather here, the men who spawned the trout were subjected to a very severe ordeal in performing their task, although the thermometer did not register a greater degree of cold than 20° F.

Mr. Loren Green took most of the eggs this season, and is entitled to much credit for the endurance and perseverance that he exhibited in accomplishing his work. I may add here that Mr. Myron Green, who has had charge of the trout-ponds ever since they were started, resigned his position this summer, owing to his health having become impaired by exposure during the rainy seasons of this climate.

It will be observed by looking at the daily record of eggs taken that there was an interval of two weeks, from January 5 to January 19, when no eggs were taken. This was owing to the very cold weather, which, coming also without rain, seemed to check almost entirely the spawning of the trout. When the weather grew warmer, and particularly when it also rained, the spawning trout came on very rapidly, Mr. Green says, and when it was clear and cold they seemed to have no disposition at all to deposit their eggs. It will also be observed, by looking at the record of the daily yield of eggs, that the spawning season extended over a period of three months, from January 4 to April 4, and that even after April 4 some eggs were taken, which were hatched for the river. This long period of spawning is probably due, I think, to the fact that the creek on which the trout-ponds are built is supplied very largely by springs, it being a well-known fact among trout raisers that the presence of spring water in a stream prolongs the spawning season; and in a large stream, fed wholly by springs, the trout, at least in the eastern waters of the United States, continue their spawning operations several months longer than those in brooks not fed by springs.

Up to the present season no systematic attempt has been made at the McCloud River trout-ponds to rear young trout, the surplus of young fry at the end of each season having been turned into the river, and I may add here that it is very proper, and perhaps indispensable, that a considerable number of young fish should be put into the river each year in order to keep up the river's stock, the yearly draft on the natural supply of trout in the river, caused by our capture of breeding fish for the ponds, being now quite perceptible in its effects.

This year several thousand young fish were reserved in the hatching troughs after all the eggs had been sent off and 20,000 young fry had been turned into the river. These reserved fish were placed in a pond by themselves and the experiment will be tried this year of raising them. It will undoubtedly prove to be only an experiment this season, as all the enemies to the young trout at this place and the difficulties to contend with here in raising them are not yet fully known, but it is hoped that it will be a basis for successful operations in future seasons. Next year, at all events, an elaborate effort will be made to raise a considerable number.

With a view to raising some breeders from the egg, and at the same time to provide more room for those already in stock, new ponds have been built this year, and there is not much doubt that even a larger number would be desirable, for, although the supply of water is very large and of the best quality, it is probable that the breeders are still too closely confined for maintaining perfectly favorable sanitary conditions.

The fishing for parent trout was continued this year, and probably enough were caught to supply this year's waste in the ponds, caused by the various adverse agencies to which trout are exposed, and whose destructive character the trout breeder knows very well.

The fishing was conducted this year on the same general plan as heretofore, viz., by using set-lines stretched from one point to another in the river, and furnished with lateral lines at suitable intervals, to which are attached the hook and bait. These lateral lines extend to the bottom of the river, for unlike eastern trout (*Salvelinus fontinalis*) the McCloud River trout (*Salmo irideus*) feed off the bottom of the stream. Their method of looking for food is peculiar and wholly unlike that of their eastern cousins. Every trout fisherman in the Eastern States has noticed that the speckled *fontinalis* is always looking upwards for food as if expecting, as he really does, that his food will come from above. He is also generally evenly poised in the water and sits in it like a well-trimmed ship on a quiet day at sea. The California trout, on the contrary, roams about his watery hunting grounds partly on his side with one eye directed to the bottom. He is quite as dependent, and probably more so, upon the supply of food that is beneath as for the supply that falls from above or floats on the surface. Consequently he spends as much of his time looking down for food as he does looking up for it. He has another peculiarity also about feeding: When he sees any food on the bottom that looks to him out of place, or has from any cause a suspicious appearance, he wheels past it, and as he passes the suspicious object he strikes it a vigorous blow with his tail and then turns to observe its movements. If there appears to be anything "crooked" about it he will not touch it, and will, after striking it perhaps once or twice more with his tail, abandon it alto-

gether. This we have occasion to notice very often on our fishing grounds, because before setting the lines at any particular spot we "salt" the ground for two or three days before, by freely strewing bait about the place where the lines are to be set. When the trout first come up and see the bait—usually salmon eggs—scattered about so lavishly, in such an unusual place, they seem to suspect at once that there is something wrong about it, and they knock the eggs about vigorously with their tails and watch the bait very cautiously and suspiciously, and it often happens that they will repeat this a day or two before they will decide to swallow this unexpected but tempting food; and Mr. Green assures me that, unless the trout had had their suspicions set at rest by this false and harmless bait, they sometimes could not be persuaded, except with difficulty, to take the real bait in which is concealed the fatal hook.

Much is said about the red-banded trout of these mountain-regions, as if they were a distinct variety of trout from the others; and one often hears sportsmen inquire whether they can catch the red-banded trout at a specified place, as if they thought that the trout with the red band were not only different, but much better than the other trout. This is a mistake. The red band is not a mark of a better variety or a different variety, nor, as far as I have been able to learn, a sign of anything in particular except age. It is a badge of maturity and that is all. It is not found on trout less than a year old, but I think I am authorized to say that it is constant or nearly so in very old trout. At all events, the absence of the band is not known to be a sign of anything except youth, for, if you catch a middle-aged trout with the red band, you may catch another feeding by the side of it, of the same variety, age, sex, and of the same size, which does not have the red band. Neither does the band, nor the absence of the band, appear to be a mark of any special season with the fish, for at all seasons of the year, in the spawning season and out of the spawning season, when prime and when not prime, you will find trout with the red band and trout without it side by side and looking otherwise just alike, and this is true of all ages and of both sexes, except, as just remarked, with trout less than a year old, which never have the red band, and with very old trout, which I think always have it. Perhaps it is also safe to say that the older the trout the more likely it is to have the red band and the more pronounced it is likely to be. I may add here that very old trout have other distinguishing marks. Their heads and shoulders are very large compared with the rest of their bodies. Their bodies are not symmetrical, like those of younger fish, but seem to taper almost steadily from the shoulders to the caudal fin. Their mouths will open much wider than those of young trout, and their tails, when stretched, will be less forked; indeed, in very old trout their tails are almost perfectly square, as it is called, by which is meant that the outline of the caudal fin is at the posterior end, when stretched

straight, instead of forked, as it is in young fish. Old fish also have in general a gaunt, ill-favored look, and their flesh is usually a dusky white.

In my last year's report on the trout-ponds, the abundance and proximity of panthers or California lions (*Felis concolor*) was alluded to. One of these, which for several weeks had made himself particularly obnoxious as well as familiar about both the McCloud fishery stations, was shot in the month of September (1882). After the killing of this panther the rest kept away from the settlements to some extent, and we did not see much of them till about midsummer of this year (1883), when they began to come around again. In the latter part of July of this year (1883) Mr. Radeliff came suddenly upon three panthers not far from the fishery on the Copper City trail. Not long after, a large panther crossed the same trail in the daytime, just after Mr. Barber had passed along on horseback, and about the middle of August "Short Jim," one of our Indians, saw a panther in the midst of a herd of cows trying to carry off a calf, but the cows "horned at it" so, to use the Indian's expression, that the panther had to give up the undertaking. Jim had his rifle with him, but said that he could not shoot at the panther without endangering the cows. A day or two after, a panther came down to Mr. Barber's house in the evening, and being chased by his dogs ran about the vicinity for a considerable time and crossed the garden twice with the dogs after him. He cuffed one of the dogs finally, and soon after disappeared. This was peculiar conduct on the part of the panther, for usually when chased by dogs they will almost immediately take to a tree. We have not yet ascertained for a certainty whether the panthers ever have or ever would molest the trout in the trout ponds, though the presumption is that if they thought they could take the trout with safety they would do it, as they will, notwithstanding the cat's proverbial dislike to wetting its feet, frequently get into the water of their own accord, and it is not unusual for them to swim the McCloud River. We think it best, at all events, to be on the lookout for them, as well as for wild-cats, lynxes, coons, minks, otters, and other enemies of living fish, and for the purpose of affording them protection we have two dogs at the trout ponds, one of which is always chained at night between the two principal ponds, and the other near the other ponds. Mr. Green has a partially tame wild-cat, which he thinks he will also keep chained at the ponds for the further protection of the trout.

When this report closed, December 31, 1883, the last accounts from the trout-ponds stated that they were in good condition, that the fish were doing well, and that they were expected to begin spawning in a very few days.

Below will be found a daily record of the number of eggs taken this year, and also a table showing how the eggs were distributed.

CHARLESTOWN, N. H., December 31, 1883.

*Daily record of trout eggs taken at the McCloud River trout-breeding station of the United States Fish Commission during the season of 1883.*

Date.	Number of females spawned.*	Number of eggs taken.	Date.	Number of females spawned.	Number of eggs taken.
January 3	20	25,000	March 9	15	14,000
January 4	25	28,000	March 10	15	15,000
January 5	20	22,500	March 17	5	6,500
January 10	10	13,000	March 18	23	27,000
January 22	22	26,000	March 27	14	16,000
February 5	23	28,000	March 28	15	17,000
February 15	14	17,000	March 29	12	17,000
February 20	15	21,000	March 31	7	10,000
February 21	14	19,000	April 2	15	12,000
February 22	14	14,000	April 5	14	14,000
February 24	12	15,000			
March 7	9	12,000	Total	333	388,000

\* Average per fish, 1,165+.

*Table of distribution of trout eggs from the McCloud River (California) station of the United States Fish Commission during the season of 1883.*

Date.	Consignees.	Destinations.	Number of eggs shipped.
January 25	S. F. Baird	Washington, D. C.	50,000
January 26	do	do	21,000
February 12	do	do	12,000
February 15	do	do	24,000
February 20	B. F. Shaw	Anamosa, Iowa	5,000
February 26	William Griffith	Louisville, Ky.	5,000
February 26	G. W. Delawder	Druid Hill Hatchery, Baltimore	5,000
February 26	E. A. Brackett	Winchester, Mass.	5,000
February 26	C. J. Huske	Columbia, S. C.	5,000
March 4	Dr. J. S. Logan	Saint Joseph, Mo.	5,000
March 4	George Jolliffe	Westport, Conn.	5,000
March 4	C. S. White	Romney, W. Va.	5,000
March 7	Dr. E. B. Kennedy	Omaha, Neb.	5,000
March 7	D. Y. Howell	Toledo, Ohio	5,000
March 7	Col. M. McDonald	Smithsonian Institution, D. C.	5,000
March 7	George W. Riddle	Plymouth, N. H.	5,000
March 9	E. G. Blackford	Fulton Market, New York	30,000
March 13	S. F. Baird	Washington, D. C.	14,000
March 27	do	do	24,000
April 5	do	do	45,000
April 13	E. G. Blackford	Fulton Market, New York	15,000
April 14	S. F. Baird	Washington, D. C.	37,000
		Deposited in McCloud	20,000
		Deposited in trout-ponds	12,000
		Lost	24,000
		Total	888,000