4.—HISTORY OF OPERATIONS AT THE FISH-HATCHING STATIONS ON THE McCLOUD RIVER, CALIFORNIA, FROM THE BEGINNING, AUGUST, 1872, TO OCTOBER, 1884.

By LIVINGSTON STONE.

In August, 1872, the writer was deputized to establish on the Sacramento or its tributaries a station for collecting and distributing salmon eggs on a large scale. It was too late in the season to take many eggs that year, but the right spot was found and a temporary station erected near the McCloud River, where a few thousands eggs were matured for shipment and transported safely across the continent to the Atlantic coast.

The next year (1873) the station was moved down to the water's edge on the right or west bank of the McCloud River, 2 miles from its mouth. The parent fish were caught in a sweep seine, and the hatching-troughs were put up under large tents erected for the purpose. The water supply was raised from the river by a current-wheel and taken to the hatching-tents in a flume. As the hatching-troughs rested on a low bar near the river, it was only necessary to have a wheel 12 feet in diameter. After the spawning season began the seine was run diligently night and day by two separate gangs of men, but notwithstanding the efforts that were made only 2,000,000 salmon eggs were taken. As the run of salmon in the river was abundant this year, and as no pains were spared to capture them, this result demonstrated that 2,000,000 was about the maximum number of salmon eggs that could be collected at the station in a single season by the methods in use up to this time. As the especial object of this station was to collect eggs *on a large scale*, the result, although obviously very large, compared with anything of the kind that had preceded it, was by no means satisfactory.

Accordingly the next year, 1874, a plan was conceived and carried into execution for capturing more parent salmon, by putting an obstruction across the river above the fishing ground which would let the water through but would arrest the upward progress of the fish. This plan succeeded beyond the most sanguine expectations of all. The obstructions, which consisted of a bridge, with a wooden rack or fence reaching from the floor of the bridge to the bed of the river, was erected about the 1st of July, and in a few weeks the salmon swarmed in thousands in the river below the bridge. The problem of getting salmon eggs on a large scale was solved. Nearly 6,000,000 eggs were taken that season with far less exertion than had been expended in taking 2,000,000 the year before. It was an embarrassment of riches, however, for by the old method of hatching salmon eggs in single layers, it would take nearly half an acre of ground to furnish room for hatching so many eggs, or rather for bringing them forward to the proper stages for distribution. To meet this emergency deep trays or baskets were devised, in which, by placing them in a trough that the water had to force itself upwards through, the eggs could be placed several layers deep, and as many hatched over an area of 1 superficial foot as formerly required 12 superficial feet. These new trays or wire baskets, after a little experience, worked to perfection and completely removed what had begun to appear a very serious obstacle, viz, the difficulty of furnishing space enough to carry such an enormous quantity of salmon eggs.

The next difficulty that needed to be removed was the danger of interference from outside parties. The station was on "wild land," and there was nothing to prevent a settler or any one else from camping down beside us and fishing where we were fishing.

The next year (1875), General Grant, who was then President of the United States, helped us out of this difficulty by very prudently making a reservation of such a tract of land as was required for the operations of the hatching station, and thereafter no trouble whatever has been experienced from intruders. Had it not been for this very opportune action of General Grant I think some serious complications would have arisen.

Up to this time we had suffered no small inconvenience, owing to the hatching operations being carried on at so low a level. The hatching apparatus was erected on the low bar above mentioned, to avoid the risk and expense of raising the water supply any higher; but it became necessary, of course, on account of high water, to tear up everything before the rainy season began, and to carry apparatus, tents, and all high enough up the banks to be out of the way of the winters' floods, and the next spring to carry them all back again, and put them in place on the bar. This proved to be such an inconvenience that when the season of 1876 opened, a permanent wooden hatching house—a very solid structure—was built 15 feet above the summer level of the river, and a current wheel, 27 feet in diameter, resting on solid piers, was erected in the river, in place of the 12-foot wheel that had been used before. The new hatching-house was a success in every respect, and so was the wheel till a sudden rise in the river carried it off. The next year (1877) I built a new wheel, and substituted flat boats for piers as a support for the wheel. The boats worked perfectly, and, rising and falling with the water, saved the wheel from all danger by floods.

The next year (1878) this station reached its maximum of operations, 14,000,000 salmon eggs being successfully taken, two car-loads of which were shipped to the Atlantic coast and several million to foreign countries.

The next year (1879) was an uneventful one at the salmon-breeding ranch, but during the season a trout-breeding station was established on the east bank of the McCloud River, 4 miles above the salmon fishery. In 1880, operations were conducted as usual at the salmon fishery, and without much change except that improvements of a general character were added to the station. At the trout ponds, fishing was pursued vigorously for the purpose of acquiring breeding trout, and 338,000 trout eggs were taken.

In 1881 came the tremendous floods, which mark an era in the history of Northern California. Nothing approaching them in volume or destructiveness had been known since the arrival of white men in that region. Over 9 solid feet of water fell over the whole face of the country that season. The effect was indescribable. The climax seemed to be reached on the night of the 3d of February, when the McCloud River rose 26 feet above its summer level, and, pouring down a resistless torrent, carried away almost every vestage of the salmon-breeding station.

Through the intervention, however, of Hon. B. B. Redding, of the California Fish Commission, and U. S. Senator Booth, Congress made an appropriation for rebuilding the station as quickly as possible. Men and materials were procured, and the work of reconstruction was begun, and before the season was over a new hatching-house, mess-house, and stable were erected, and a current wheel, 32 feet in diameter, with two large flat-boats for supports, was placed in the river. The McCloud was bridged over as usual, and the station in all other respects was put in complete running order, and 7,500,000 salmon eggs were taken, most of which were hatched for the Sacramento River. No serious damage was done to the trout-pond buildings this year by the floods, but many of the parent trout were injured by the mud that was washed into the ponds, and only 261,000 eggs were taken.

In 1882 the appropriations from Congress came so late that but little was attempted in the direction of taking salmon eggs. Four million, however, were collected and hatched for the Sacramento River. At the trout ponds 337,500 trout eggs were taken, most of which were shipped to the Eastern States.

In 1883 the Central Pacific Railroad Company laid a track from Redding, north, along the line of the Sacramento River to Sacramento Bridge. The blasting operations of the construction corps prevented the parent salmon from ascending the river as usual, so that, although unusual exertions were made to take a creditable number of salmon eggs, it was found impossible to obtain over 1,000,000. At the trout ponds 389,000 trout eggs were taken.

On account of the unfavorable effect of the railroad blasting on the salmon in 1883, it was decided not to continue active operations at the salmon-breeding station in 1884, which was accordingly kept closed during this season.

At the trout ponds 315,000 eggs were taken and distributed in 1884. This station is still in active operation, and at the present writing promises to yield a good supply of eggs at the next spawning season.

Below will be found tables giving the number of salmon eggs and trout eggs taken at the two stations of the United States Fish Commission on the McCloud River, California, during the whole period of their operations from 1872 to 1884, inclusive:

Salmon eggs taken.

Year.	No. of eggs.	Year.	No. of eggs.
1872	30,000	1880	7,500,000
1873	2,000,000	1881	7,500,000
1874	5,750,000	1882	4,000,000
1875	8,610,000	1883	1,000,000
1876	7,500,000	1884	....
1877	7,000,000		
1878	14,000,000	Total	71,890,000
1879	7,000,000		

NOTE.—As most of the above figures are largely underestimated it is probably safe to assume that seventy-five or eighty million salmon eggs were taken at this station in the twelve years from 1872 to 1883, inclusive.

Trout eggs taken.

Year.	No. of eggs.	Year.	No. of eggs.
1879*	....	1883	389,000
1880	338,000	1884	315,225
1881	261,000		
1882	337,500	Total	1,640,725

* Station established.

5.—TRANSPLANTING LOBSTERS TO THE CHESAPEAKE*—EXPERIMENTS UPON THE TEMPERATURE THEY CAN ENDURE.

By Lieut. W. M. WOOD, U. S. N.

October 18 I procured from Mr. E. G. Blackford, in New York, 125 live lobsters of small and medium size, many of them being females with a full supply of eggs. They were placed in a tank through which salt water was circulated, but quite a number died the first few hours, being probably in poor condition when received from the market. On our arrival in the Chesapeake, I deposited 63 in good condition and trust they may be heard from in the future. They were deposited off Block River light at 11.30 p. m., October 19.

I tried the following experiments in this connection by means of the ice machine. In a cask containing salt water and maintained at a temperature of from 34° to 36° F. I placed 5 lobsters. At the end of twenty four hours 3 were dead and 2 alive and in apparent good condition.

In the cold chest, kept at a temperature of from 34° to 38° F., 5 others were put. At the end of twenty-four hours 2 were dead, 2 in excellent condition, and 1 rather weak. The 3 latter were allowed to remain another twenty-four hours, or forty-eight hours in all. The weak one was then dead and the other two in pretty good condition

*On a previous planting see report in Bull. F. C. 1884, p. 16.