# XXXIII.—REPORT UPON THE HATCHING AND DISTRIBUTION OF PENOBSCOT AND LAND-LOCKED OR SCHOODIC SALMON IN THE SPRING OF 1882.

By Fred. Mather.

Concerning the operations of hatching Penobscot salmon and land-locked salmon at Roslyn, N. Y., and distributing them to waters in the State of New York, I have the honor to report as follows:

## PENOBSCOT SALMON.

I received your order to try and obtain the use of a hatching house near New York, for the purpose of hatching 120,000 Penobscot salmon eggs, on January 16. I immediately wrote to Mr. Thomas Clapham, Roslyn, N. Y., whom I knew to have one that was not in use. The next day he telegraphed me that I was at liberty to use his house and that he would afford me every facility in his power. I then ordered hatching frames, wire cloth, &c., and on the 20th went to Roslyn and ordered new troughs. The same day, Mr. Blackford telegraphed me of the arrival of the eggs at his place in Fulton Market, New York. Mr. Clapham's hatchery had not been used in some years, and the floor of the building was two feet below ground. He had thrown in earth and made a pond of it. This had to be drained, cleaned, and repaired. On the 28th the frames, troughs, &c., were tarred, and the eggs sent for. They were received in good order (144 dead) and put out. Mr. Atkins telegraphed that 80,000 more were coming, and I had more troughs made and tarred. The second lot arrived at Roslyn February 4, also in good order (37 dead), and the first were hatching freely.

On the 15th of February I learned from Mr. Atkins that 37,500 more eggs were coming, and I telegraphed to Roslyn to have four more troughs made, and the next day went down with the eggs, and tarred the new troughs, and on the 17th 50,000 additional eggs arrived. These last two lots were also in good order (203 dead), but they did not do well after hatching, on account of the insufficient tarring of the troughs, which were of new pine. On the 23d these looked so badly that I determined to double them up in the other troughs and char the ones the fish were in. The fish had a peculiar white liver, presenting a curious spotted appearance as they lay in mass, and there was considerable "dropsy" or blue swelling. In this connection I will take the liberty of calling your attention to extracts from a paper which I read before

the annual meeting of the American Fish-cultural Association April 1, 1882.

I have believed heretofore that every portion of the sac was necessary to the complete development of the fish; and have been rather amused at the innocent question sometimes asked, "When does the sac drop off?" All fish-culturists have noted the fact that an embryo with a small coagulation in its sac, caused by an injury while in the egg, or after hatching, will die near the time that the injured portion is about to be taken up by the absorbent vessels; but, to my surprise, I have seen portions of the sac thrown off this winter, and the fish have lived and taken food afterward.

In this hatchery the troughs were all new, and the haste with which they were made allowed but little time for coating with tar. One trough in particular had but a very light coating, and soon after the hatching of the eggs a singular spotted appearance was observable among the fry. This was caused by the turning white of their livers. Both Professor Ryder and myself examined them under the microscope, and saw the clouded liver, through which the blood appeared to circulate feebly. Knowing no other cause than the exudations of unseasoned pine wood, I removed the fry at once, and placed them in a well-tarred trough, and watched the result. Neither Professor Ryder nor myself thought that the fish, some 15,000 in number, could live. He was of the opinion that the trouble originated in the sac, and that a deficient circulation in some portion had affected the liver. It was a new experience to both of us, and his extensive knowledge of embryology gave his opinion a weight which led me to accept his view, although I could not see any trouble in the sac at this time. I gave him some specimens afterwards which confirmed this theory, which I am now satisfied was a correct one.

The first indication of trouble in the sac was an elongation of the posterior portion of it, and a constriction about midway between its extremity and its connection with the body. Sometimes the portion beyond the constriction contained the large oil globule, and sometimes it did not; and this globule seemed to be very irregular in its position. All the fish in the trough were so affected, and in addition to the "liver complaint," the blue swelling, or "dropsy," appeared. The latter was fatal in every case, the microscope showing a deposit of watery fluid between the two membranes of the sac, in which great numbers of blood corpuscles could be seen drifting about.

In one form, the part cut off from the circulation by the constriction seemed to wither away, and I suspect that only a small portion was affected. In another, a small globe separated from the sac by a cord; and this globe was clear and had no sign of an opaque spot or injury. In a third instance, a larger portion of the sac was cut off by the cord and held suspended, giving somewhat the appearance of the sac and umbilical cord of the skate. Thus far I had but small hopes of the fish surviving, until one day while trying to capture a lively fellow which

had a large ball hanging by a string, the fish made a sudden turn to escape the feather, which was under it, and I saw the cord break and that portion of the sac contained in the ball fall to the bottom. That particular fish was soon lost in the mass and could not be identified. I preserved several specimens which had lost the pendant ball and were about ready to take food. Of the original fifteen thousand in the infected trough, about three thousand died with blue swelling, and two thousand more from other causes, leaving ten thousand fry now taking food, of which a greater portion have lost some part of their sac. I firmly believe that had I not applied a remedy promptly the whole lot would have been past saving if left in that trough twenty-four hours more.

To those to whom it seems incredible that part of the sac of a trout or a salmon should be thrown off by a mighty effort of nature when found to poisoned, I would suggest following my experiment, if a blunder can be so called, and when the liver of the fry turns white, remove the fish into a clean, healthy trough, and note the result.

In this connection it has occurred to me that the reason that trout do not flourish below saw-mills is on account of the water being impregnated with either pine or oak. In 1875 I lost a lot of California salmon at Blacksburgh, Va., in an oaken trough which one of the then fish commissioners of Virginia, in whose employ I was, insisted upon my using. The impregnation of tannin was perceptible to the taste, and the fry died as fast as hatched. The theory of the fishermen near saw-mills is that the sawdust gets into the gills of trout and kills them. This may be true to some extent, but I doubt it, for the reason that sand or other material does not appear to injure the gills, and I have taken adult trout below saw-mills. I incline to think that the mills are destructive merely to the young, by covering the spawning beds to some extent with sawdust, but more by the absorption of turpentine from the pine or tannin from the oak, the evil effects of which we know too well.

From this insufficient tarring I probably lost 30,000 fry more than the regular percentage to be expected, and a lot of 8,000 weak ones, which were crowded against the lower end of a trough, were turned out into Mr. Clapham's stream. By March 6 the white liver had largely disappeared and the dropsical fish had died and no new cases appeared. All went well from this time. The charred troughs were kept for a lot of fish, 57,000, which arrived March 17, making 344,500 eggs in all.

*Eggs received.*

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| January 28 | 120,000 |
| February 4 | 80,000 |
| February 16 | 37,500 |
| February 17 | 50,000 |
| March 17 | 57,000 |
| Total | 344,500 |

*Fry planted.*

| 1882. | |
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| April 13. In Carr's Brook, Warren County, New York | 35,000 |
| April 21. Balm of Gilead Brook, Warren County, New York | 40,000 |
| April 25. In The Glen, Warren County, New York | 50,000 |
| May 4. In Ramont, Warren County, New York | 45,000 |
| May 10. In Gulf Brook and Hokum Pond Brook, Warren County, New York | 55,000 |
| Total in tributaries of the Hudson | 225,000 |
| May 2. In Beaver Dam Brook, Oneida County, New York | 25,000 |
| May 2. In Trout Brook, Oneida County, New York | 20,000 |
| Total in tributaries of Salmon River | 45,000 |
| Planted in Mr. Clapham's brook, Glen Head, N. Y. (sick fish) | 8,000 |
| Escaped in Mr. Clapham's brook, Glen Head, N. Y | 2,500 |
| Delivered to Mr. Corbin, for stream on South Bay, N. Y | 1,000 |
| Total fry | 281,500 |
| Eggs left with Mr. Blackford, Fulton Market | 8,000 |
| Eggs lost in hatching | 4,500 |
| Fry lost in troughs | 50,500 |
| Total eggs received | 344,500 |

The loss in eggs and fry was about 14½ per cent., which was largely owing to the limited time in which the troughs were prepared.

The following are the notes taken of the character of the streams in which the fish were placed. The village of North Creek, Warren County, New York, being the northern terminus of the Adirondack Railroad:

Carr's Brook empties into the Hudson on the east side, three miles below North Creek. The fish were placed two miles above its mouth, just above a bridge where two streams come together. A good trout stream with a small dam below. Water 36° on April 14.

Balm of Gilead Brook comes into the Hudson on the west side, four miles above North Creek. A good, swift trout brook with no dams. Fish placed a mile and a quarter from its mouth. Water 35° on April 20.

Glen Brook, near the Glen Station on the Adirondack Railroad, about 15 miles south of North Creek, on west side of Hudson. It is a swift trout stream, with a small dam and saw-mill near its mouth. The fish were planted above the dam about three miles. Water 48° on April 27.

Ramont Brook (I am not sure of the spelling of this name, but give it as the natives spoke it) empties into the Hudson two miles above North

Creek on the west side. A good trout stream, with no mills or dams. Fish were placed a mile and a half above its mouth. Water 40° May 5.

Gulf Brook and Hocum (or Hokum) Pond Brook, both excellent trout streams. The fish were placed at the junction of these two streams, five miles above the mouth, between the villages of North Creek and Weavertown. The stream is on the west side of the Hudson and empties somewhere below North Creek. It has no mills or dams. Water 36° on May 11.

I inclose letters from Mr. Wood on the subject of the deposit in Salmon River. Engagements prevented him from going up and I was met at Albion (Sand Hill post-office) by Mr. V. R. Rich, who knows the streams well. Upon his advice I made the plant in two streams as follows:

Beaver Dam Brook, one mile from railroad station; planted about one hundred rods above its mouth. Put 15,000 below a dam and 10,000 in the pond above.

Trout Brook, or Tuthill Brook, three miles from railroad station, and farther down the river, put in 20,000. It is a good trout stream, and the fish were put in where the road to Richland crosses the stream, just below a mill, on May 2. Temperature not taken.

## THE LAND-LOCKED SALMON.

On February 18, 10,000 eggs were received at Roslyn; 290 eggs and fry were lost before planting; a trifle less than 3 per cent. Half the fry were sent to the South Side Sportsmen's Club, of Long Island, May 2, and the remainder I took to Rome the same day, and sent them on alone to Syracuse, while I went to Salmon River with sea salmon. At Syracuse they were met by Mr. James S. Plumb, of that city, who took them to Skaneateles and deposited them in Skaneateles Lake.

On May 18 I packed up the property belonging to the Fish Commission, except the troughs, which are very poor ones, and sent it for storage to Mr. Blackford, Fulton Market, New York.

NEW YORK, *May* 20, 1882.