V.—REPORT OF OPERATIONS AT COLD SPRING HARBOR, NEW YORK, DURING THE SEASON OF 1885.

By Fred Mather.

On the work in hatching and distributing different species of Salmonidæ and other fishes at this station (owned by the New York fish commission), done wholly or in part by the U. S. Fish Commission, I have the honor to report as follows:

WHITEFISH (COREGONUS CLUPEIFORMIS).

On January 1, 1885, there was received from Mr. Frank N. Clark, of the Northville, Mich., station, one case containing 1,000,000 whitefish eggs in excellent condition. These eggs were placed in the McDonald jars, and hatched well. They were distributed in the deep lakes of Long Island, where it is possible that they will live. Letters from J. H. Perkins, esq., of Riverhead, Suffolk County, New York, the county treasurer, say that it is rumored that specimens of whitefish of a quarter of a pound had been taken from Great Pond, near that place, of the previous year's planting, but we have been unable to get specimens, and the rumors cannot be traced to any reliable source, although Mr. Perkins has tried to do so.

BROOK TROUT (SALVELINUS FONTINALIS).

On January 31, 1885, we received from Mr. Clark one case containing 7,000 eggs. They came during very cold weather, and much of the moss packing was frozen, and some ice was among the eggs, which were quite dry and considerably indented. We sprinkled them with spring water, at 38° Fahr., until we brought them up to that temperature, when they were placed in the troughs. The loss of eggs during hatching was 687, and of fry 536, or about 1,200 in all. The fish were placed in streams at Islip and Bellport, on Long Island. Also there were planted 10,500 fry, hatched from eggs taken at the hatchery.

RAINBOW TROUT (SALMO IRIDEUS).

February 25, 1885, we received from the station at Northville, Mich., 10,000 eggs of the rainbow trout in good condition, and on March 9

another case containing an equal number, which were also in good order. These eggs hatched very well, and 14,500 fry were placed in streams within the State of New York.

The details will be found in Table III.

PENOBSCOT SALMON (SALMO SALAR).

This was the second year of our operations at this station, and the apparatus was in better working order, as is usually the case with older troughs, and we had a very successful hatching season. Encouraging accounts of the plantings in Clendon Brook, one of the tributaries of the Hudson, have been received from Mr. A. N. Cheney, of Glens Falls, N. Y., who writes that this brook is swarming with them, and who, by request, in October, 1885, went there and with a fly captured several specimens, which he sent to Mr. E. G. Blackford, of the New York commission, who forwarded them to Professor Baird at Washington. These fish were from 6 to 7 inches long, and were probably of the plant made in April, when the fry were from 1 inch to 1½ inches long.*

In 1885, we received 500,000 eggs of the *Salmo salar* from the station

*Since the above was written authentic accounts have been received of the capture of four adult salmon in the Hudson. One of these was taken about the middle of May, 1886, in Gravesend Bay, at the mouth of the Hudson, and weighed about 10 pounds. It was captured by Mr. John Denyse, of Gravesend, and sent to Fulton Market. Between June 1 and 4, 1886, three salmon were captured at the dam at Troy in the shad nets. These fish weighed respectively 10, 10½, and 14½ pounds.

The following notes from Forest and Stream of June 10, 1886, refer to these fish:

Salmon in the Hudson.—Another triumph has been scored for fish-culture. Salmon have been taken in the Hudson this season to the number of perhaps half a dozen at present writing. They are all recorded from Troy, below the State dam, with the exception of one taken in Gravesend Bay, which we noticed a few weeks ago. In former years an occasional stray salmon has been captured in the river at rare intervals, but these fish, coming just four years after the first stocking of the river, point to the planting of 1882 as the source of their origin. In that year a small plant was made for the U. S. Fish Commission from the hatchery of Mr. Thomas Clapham, at Roslyn, Long Island, by Mr. Fred Mather, who has since continued the work on a larger scale from the station of the New York Fish Commission at Cold Spring Harbor, under orders of Professor Baird, of the U. S. Fish Commission., State Commissioner Blackford is making efforts to get all the information possible concerning the capture of salmon in the river, and we shall, no doubt, hear of others being taken. The eggs from which these fish were hatched came from the United States station at Orland, Me., in charge of Mr. C. G. Atkins. The Hudson may yet become a salmon stream. Put up the fishways now, and protect the fish which have escaped the meshes of the innumerable shad-nets of the lower river, and give them a fair chance.

Several salmon have been taken below the dam at this city within the past week. There are known to be four, and there are rumors of others. The largest one which we have any positive record of weighed 14½ pounds, and it was a fine plump fish. The salmon are now stopped at the dam here, and are being taken in nets. This should be stopped at once, and fishways should be built to allow them to reach the upper river, where they can spawn. The fact that there are salmon in the Hudson

at Orland, Me., in charge of Mr. C. G. Atkins. Four cases, containing 250,000 in all, arrived on January 15, 1885, at 7 p. m., in good condition, and were unpacked the next day at 10 a. m. The temperature of the water was 44 degrees and that of the eggs the same. Three hundred and eighty eggs were found dead on unpacking. On January 22 we received from the same source four additional cases, containing the remainder of the eggs, which were in equally good condition. They were unpacked the next morning at 8 o'clock, the temperature of the packing being 34 degrees, while the water in our troughs was 36 degrees. The number of dead eggs in this last lot was 1,930. In none of these cases were there any indented eggs, which is always a sign of lack of moisture in the package, and I cannot too highly commend the excellent manner in which they were packed for domestic shipment. Of these 500,000 eggs, which will be accounted for in exact figures in the tables at the close of this report, our loss was 75,000 in eggs or fry and by reason of those different deformities which are familiar to fish-culturists. Of the 425,000 remaining, 270,000 were planted in the tributaries of the Hudson in Warren County, N. Y.; 100,000 were sent to the tributaries of the Delaware River in Sussex County, N. J.; 50,000 were placed in the Oswego River; and 5,000 were distributed privately.

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should arouse anglers and game protectors to see that the first crop is not destroyed. [J. H. R., TROY, N. Y., *June* 7, 1886.]

Mr. H. P. Schuyler, of Troy, has written to Mr. M. M. Backus, of New York, that on Monday last a 14½-pound salmon was caught at the State dam, making the third within a week, whose aggregate weight was 35 pounds. Mr. Backus writes to Mr. Blackford that there is an impression at Troy that a few years ago the State legislature made an appropriation for a fishway at Troy, but it has never been built. Mr. Schuyler says that the fish referred to will be the last one killed, as "a few knights of the angle intend to take matters in hand," and that his brother has notified the fishermen that all fish taken in future must be returned to the water, and adds: "I believe the waters in the vicinity of the dam are swarming with salmon that are unable to get above the dam."

Two salmon have been taken here. These must be fish that were planted three or four years ago by the U. S. Fish Commission from the Long Island hatchery. I saw the first shipment taken to North Creek by Mr. Mather in 1882, while they were on the platform at Saratoga, and expressed my opinion to him that it was doubtful if they would ever return, because they were so small. I am prepared to believe that more will come. [D. Y. SMITH, TROY, N. Y., *June* 7, 1886.]

On the 2d day of June some fishermen took from the waters of the Hudson, just below the State dam at this city, a strange fish, some 10 pounds in weight. They presented the fish to their employer, who was also ignorant of its proper name and species, but found it very good eating. Yesterday another of the same fish was taken at the same place. It was brought to the city, and in the evening I had the pleasure of inspecting a fine male salmon, which measured 28 inches in length, 16 in girth, and weighed 10 pounds 8 ounces. Did not the legislature provide for the construction of a fishway in the above-mentioned dam? If so, let us have it at once. [SEYMOUR VAN SANTVOORD, TROY, N. Y., *June* 4, 1886.]

These adult salmon, I have no doubt, are of the planting in 1882, which was made from the hatchery of Mr. Clapham, at Roslyn, N. Y.

In the distribution to the waters of the Hudson I relied upon my own knowledge of the character of those Adirondack streams, and of the reports of the residents there concerning the logging operations, and all streams on which there were dams and logging was going on were avoided. It often happens that a stream is used for logging one season and is not so used the next. The logs are hauled to the bank of a stream in winter when the snow will permit sleds to be used in the woods. A dam is built which floods the water back as far as possible and makes a large lake. The logs are all brought in at this point or below and thrown into the water; those above are held by a boom. When all is ready in the spring, and the snows are melting, and the streams are consequently filled, this dam is cut away and the logs are swept down into the river below, while all those which were thrown into the river below the dam are picked up and carried down with the flood. They are caught miles below with a boom, and each owner recognizes his logs by the marks upon them. This work causes a plowing up of the gravel-beds by the logs, which are tumbled over each other, and the sweeping out of the bed of the stream; and the young fish seek safety on the banks, where they are often left in pools to perish. We have in every case avoided streams which were being used for this purpose, and have planted only streams which were left in a natural condition, and which were at the time, or had been, trout-streams, where we felt sure that the young would find sufficient food at the time of planting.

LANDLOCKED SALMON (SALMO SALAR *var.* SEBAGO).

On March 19, 1885, we received 60,000 eggs of the landlocked salmon from Mr. Charles G. Atkins, Grand Lake Stream, Maine. They were unpacked the next day and found to be in excellent condition. These eggs were presented by the Commissioner to the New York State fish commission, and were by them assigned to some of the Adirondack lakes, but, through some misunderstanding, I did not get specific orders in time to plant them there, and the fish were kept so long in the troughs that there was danger of losing them, and they were finally planted, from the middle to the end of May, in lakes on Long Island.

BROWN TROUT (SALMO FARIO).

On February 24, 1885, we received from the Deutsche Fischerei-Verein, through its president, Herr von Behr, a box containing 40,000 eggs of the *Salmo fario*, popularly called in England "brown trout." The eggs were forwarded by Mr. F. Busse, of Geestemünde, and half of them were billed to Mr. E. G. Blackford, and the remainder to myself. These eggs, which came from the ponds of Mr. Carl Schuster, near Freiburg, in Baden, arrived in very good order. The fry from these eggs were planted in Queens, Suffolk, Westchester, and Rockland Counties, N. Y.

The few which we have kept have grown wonderfully, are handsome and gamy trout, and are said to bear some what warmer water than our Eastern brook trout, the *Salvelinus fontinalis*. We have one of these fish now in our ponds, a male, which at two years old weighed over a pound. I think them the strongest and gamiest trout I have ever handled.

SMELTS (OSMERUS MORDAX).

We have been fairly successful in hatching these very refractory eggs, which, on account of their glutinous character, give us a great deal of trouble. We obtained the parent fish from the streams about Brookhaven, Long Island, which empty into the Great South Bay, and brought them here about the spawning time, in the first week in March. The fish are not very common on Long Island, but still inhabit a few streams. It seems to be their habit to run up at night and spawn, and the fishing for them is done mainly at this time. The fishermen all report that the catch has been decreasing for the past eight or ten years, as there is no protection by law for the fish. We had very little to guide us in our experiments, as but little had been attempted with these fish, and that in a small way, and not much has been published on the subject. The fish begin to run up the streams of Long Island from the middle to the last of February, and the run lasts about a month. Our fish were brought up on the 4th of March by the foreman, Mr. Walters, and numbered 120, some of which were nearly ripe. We experimented with the eggs on bunches of meadow-grass, on stones, and in jars of the McDonald pattern, and found that when they adhered in bunches we were more or less successful, and although all the eggs on the outside of the bunches died, the eggs inside were bright and good. A detailed report of this work was made to the American Fisheries Society at its fourteenth annual meeting, May 5 and 6, at Washington, D. C., and can be found in the published report of that society. We succeeded in hatching about 50 per cent of the eggs taken, which is, at this state of our knowledge of handling adhesive eggs, considered to be a fair working average; but it is possible that we may be able to increase this percentage. We took this year some 200,000 eggs, and turned out about 100,000 fry in different streams about the head of Cold Spring Harbor.

THE SALT-WATER DEPARTMENT.

Situated as we are at the head of an inlet where the fresh-water springs from the hillside flow into the harbor, we can obtain salt water of a density of 1.019 to 1.022 at high tide. The State commission has built a pond with a flood-gate which holds the water at low tide, and from which we pump it into a reservoir on the hill. The work this year was confined to hatching the little tomcod (*Microgadus tomcodus*).

known in many parts of the island as "frost-fish," and which is much esteemed here as food. These fish come close to the shores and along the docks to spawn in November and December. The eggs are not adhesive, nor are they as buoyant as the egg of the codfish, although structurally the cod and the tomcod are closely related. We took the eggs in milk-pans, after the manner of handling trout and similar fishes. The eggs were placed in the McDonald jars, where they hatched in about twenty-five days, at a temperature which ranged during the period between December 15 and January 8 from 36 to 46 degrees Fahrenheit The fry were planted in the harbor.

The following tables show the distribution of the various kinds of fish handled at this station during the season:

TABLE I.—*Distribution of whitefish from Cold Spring Harbor in March and April*, 1885.

Date.	By whose order.	Messenger.	Where planted.	Number of fish.
Mar. 4	E. G. Blackford ...	F. A. Walters ...	Great Pond, near Riverhead, N. Y	600, 000
11	Fred Mather	F. A. Walters ...	Mill-pond, near Cold Spring Harbor, N. Y.	50, 000
Apr. 8	E. G. Blackford....	F. A. Walters ...	Lake Ronkonkoma, on Long Island.....	340, 000
	Total	.....	.....	990, 000

TABLE II.—*Distribution of brook trout from Cold Spring Harbor in April and May*, 1885.

Date.	Delivered to—	Post-office address.	Number of fish.
Apr. 19	Geo. Snyder	Manhasset, N. Y	5, 500
20	H. Scudder	Northport, N. Y	1, 300
30	H. S. Jennings.....	Islip, N. Y	3, 000
30	W. T. Hawkins	Bellport, N. Y.....	3, 000
30	Wood Fosdick	Bellport, N. Y.....	2, 000
May 18	Townsend Jones.....	Cold Spring Harbor, N. Y	1, 500
	Total	.....	16, 300

TABLE III.—*Distribution of rainbow trout from Cold Spring Harbor in May*, 1885.

Date.	Delivered to—	Post-office address.	Number of fish.
May 3	George Snyder.....	Manhasset, N. Y	1, 000
4	J. R. Wood	Cold Spring Harbor, N. Y.....	1, 000
12	F. H. Weeks	do	1, 000
13	A. W. Benson	Montauk Point, N. Y.....	4, 000
14	Patrick McGovern.....	Brooklyn, N. Y	500
15	Dr. A. K. Fisher	Sing Sing, N. Y	2, 500
21	A. W. Humphreys.....	Sterlington, N. Y	3, 000
22	James Ramsbottom.....	Baldwin, N. Y.....	500
30	Weeks & De Forest.....	Cold Spring Harbor, N. Y...	1, 000
	Total	.....	14, 500

TABLE IV.—*Distribution of Penobscot salmon from Cold Spring Harbor in April and May, 1885.*

Date.	Place of deposit.	Messenger.	Fish supplied.	Loss in transportation.	Fish planted.
Apr. 27	Clendon Brook, Hudson River	F. A. Walters	*60,000	300	59,700
May 5	North River, Hudson River	do	80,000	100	79,900
8	Carr's Brook, Hudson River	do	70,000	200	69,800
13	Cedar River, Hudson River	do	60,000	100	59,900
14	Brooklyn, N. Y	By express to Patrick McGovern.	1,000		1,000
20	Paulin's Kill, N. J., Delaware River	F. A. Walters	50,000	250	49,750
22	Pequest River, N. J., Delaware River	do	50,000	400	49,600
27	Oswego River, Lake Ontario	do	50,000	†4,000	46,000
30	Pond of J. D. Jones, Great South Bay	W. S. Stoots	4,000	100	3,900
	Total		425,000	5,450	419,550

*150 yearlings placed in Clendon Brook at the same time.
†Loss owing to weakness of fish.

TABLE V.—*Distribution of landlocked salmon from Cold Spring Harbor in May,* 1885.

Date.	By whose order.	Messenger.	Where planted.	Number of fish.
May 13	E. G. Blackford	Long Island Railroad Express Company.	Pond at Montauk, L. I	4,000
22	do	James Ramsbottom	Pond of J. Ramsbottom	1,500
30	do	W. S. Stoots	Pond of John D. Jones	6,000
30	Fred Mather	F. A. Walters	Lake Ronkonkoma, Long Island.	8,000
	Total			19,500

TABLE VI.—*Distribution of brown or European trout from Cold Spring Harbor in April and May,* 1885.

Date.	Delivered to—	Post-office address.	Number of fish.
April 30	H. S. Jennings	Islip, N. Y	3,000
May 3	George Snyder	Manhasset, N. Y	6,000
4	J. R. Wood	Cold Spring Harbor, N. Y	3,000
12	F. H. Weeks	do	2,000
13	H. Scudder	Northport, N. Y	1,700
15	Dr. A. K. Fisher	Sing Sing, N. Y	3,500
21	A. W. Humphreys	Sterlington, N. Y	2,000
30	Weeks & De Forest	Cold Spring Harbor, N. Y	2,200
30	Townsend Jones	do	5,500
	Total		28,900

TABLE VII.—*Planting of smelts and tomcod from Cold Spring Harbor hatchery in January and April,* 1885, *by F. A. Walters, under the direction of Fred Mather.*

Date.	Kind.	Where planted.	Number of fish.
1885.			
Jan. 8	Tomcod	Cold Spring Harbor, N. Y	150,000
15	do	do	60,000
April 17	Smelts	In brook west side of meadow	20,000
20	do	In brook leading from mill-pond	15,000
22	do	In brook east side of meadow	30,000
22	do	Kept in the hatchery, and subsequently escaped	35,000