



Striped Bass Hatchery at Weldon, N. C.

122.—REPORT UPON THE PROPAGATION OF STRIPED BASS AT WELDON, N. C., IN THE SPRING OF 1884.**By S. G. WORTH.**

Having completed a successful season of work in the propagation of striped bass at Weldon, N. C., and as agreed upon with the United States Fish Commissioner in April last, I beg to report the following results:

On April 1, 1884, I sent Mr. C. M. McDowell to take charge of the station, and supplied him with such help as he needed, at first with three men and subsequently with four others, as necessity required. At the time of his arrival the river was somewhat full and very muddy, as it is on all occasions after rains on headwaters. No rockfish had been caught at the time of his arrival, and, indeed, no other fish had been caught except a few shad. I at once put him at work constructing a small hatchery, which he did with the assistance of three employés with a cash outlay of \$35. The building was small, being 10 by 16 feet, but well equipped with McDonald jars to the number of fifty or more. The water supply was drawn from the flume of the mills of Mr. T. L. Emry, of Weldon.

By April 10 a few striped bass were taken, but they were small. The height of the run of fish occurred between April 20 and May 1. No ripe fish were seen until April 19, when the river temperature was 58°. The weight of the fish taken on this date was 19 pounds. The last ripe striped bass was taken May 17, when the temperature of the water was 70° to 72°. From the above statement it would appear that the season for hatching striped bass at Weldon would occur between April 10 and May 20.

The first fish from which eggs were taken was caught May 2; the roe was in good condition, the weight of the fish being 15 pounds. Upon examination it was found that the roe was two-thirds spent, but the eggs taken and impregnated numbered 200,000, the quantity being estimated on the basis of 20,000 per liquid quart (impregnated eggs). These eggs were placed upon trays, the hatching jars not being in position for work, but only 50 per cent were found to be good ten hours afterwards, owing to the exceedingly filthy water which at that time was not filtered.

The second fish taken was found May 2, at 7 p. m., weight 42 pounds after being stripped of its eggs. The ovaries were about full, but some of the eggs could not be taken from the fish and were left behind. Of those taken the estimate as above shows 1,150,000. As stated above the hatchery was not ready for the reception of these eggs and all were put into the river in an impregnated state except 50,000 which were

placed on trays where they were kept fourteen hours with a loss of 50 per cent. The remaining 25,000 impregnated eggs were put into the river.

The third lot of eggs were taken May 6, at 7 p. m. The fish was one-third spent and weighed 11 pounds; the number of eggs taken was 350,000. The hatchery was still not ready. Of these eggs 40,000 were thrown away owing to the lack of milt. The remaining 310,000 well impregnated were placed directly into the Roanoke River, as were the others previously.

On May 12 the fourth fish was taken, weighing 12 pounds and containing 240,000 eggs. This fish seemed to be about half spent. While these eggs were in excellent condition, 160,000 were upset by the carelessness of a negro boy who sat down upon a loose plank upon which the pans were resting. Of this lot 30,000 were sent by express to the central hatching station at Washington for examination, but they were shipped at such an early stage that coagulation took place. Of this lot 40,000 were placed in the hatching jars and successfully hatched from the shells with a loss of 10 per cent, while the remaining few thousands unaccounted for were lost in transferring from buckets to jars, and in rough handling.

The next fish taken was on May 16, its weight being 15 pounds. A considerable portion of this fish's ovaries was spent, but 60,000 eggs were taken and impregnated and found to be in excellent condition. They were placed in the jars and 42,000 young fish were successfully hatched. Of this lot 25,000 were placed immediately in the Roanoke River at the hatchery, and 15,000 were reserved in the aquarium for the inspection of visitors, who were numerous. Of this reserve lot of 15,000 about half perished while being kept in confinement, and the remainder, 7,500, were placed in the river on the 17th of May. These eggs hatched in thirty-six hours in a temperature of 70° to 72° F. These eggs hatched earlier by eight hours than I have found them to hatch in previous years' experiments in like temperatures.

The last fish was taken on May 17, at 6 p. m., and its weight was 14 pounds, the ovaries being tolerably full. Four hundred and twenty thousand eggs were taken, which were successfully impregnated and introduced into the jars; 210,000 fry were successfully hatched and released in the river, and 10,000 eggs which had been placed upon trays were successfully hatched, the fry being kept upon trays about sixty hours after hatching.

RÉSUMÉ.—Number of fish from which eggs were taken, 6; number of eggs taken, 2,420,000; number of impregnated eggs placed in Roanoke River before opening the hatchery, 1,535,000; number of eggs placed in hatching jars, 520,000; number of fish hatched, 298,000; number of fry actually planted, 280,500; percentage of hatching of eggs handled in McDonald jars, upwards of 50.

From the experience of this season one difficulty has been overcome which heretofore seemed insurmountable, viz., the successful hatching of fish from the eggs. In my former experiments and in that of Maj. T. B. Ferguson, where the rock-fish eggs were handled in McDonald jars and Ferguson cones, there was a very great loss of eggs in the process of hatching; but in the experience of this year it has been found that by working the McDonald jar with a small quantity of water, one quart of water every three minutes, barely keeping the eggs in motion, the hatching resulted in upward of 50 per cent of the total, showing a great advance on previous work with this fish. The water used at Weldon is usually of a muddy character and requires filtering for any kind of hatching. The method of filtering used in the experiments this year was that of placing one tray above another, thus making a series of from 6 to 15, covered with coarse blanket, cotton flannel, cheese cloth, and bagging. After operations were commenced but a small quantity of water was found necessary, and through these cloths the filtration seemed quite sufficient.

It may be well to call to your mind again the fact that the striped bass handled at Weldon, were taken almost exclusively in skim nets from bateaux which ply the river from Weldon, a distance of two miles below, and secondarily from fish-traps which are used on the falls at Weldon. About 50 or 60 of the canoes fish there daily during the height of the season, when as many as 6 to 25 fish are taken in each boat per day. All of the ripe fish observed during the season were taken from these boats except three large specimens captured some distance above the falls and above Weldon. Much zeal was required to collect the ripe fish from so many boats scattered over so long a distance, but by dint of effort and careful handling of the fishermen, it is believed that no ripe fish were lost during the time when the hatchery was prepared to receive the ripe fish. At a signal any of the fishermen along the line would know whether ripe bucks were required, and so complete was the co-operation that there was no hesitation on their part to bring the fish promptly forward.

The catch during the season of 1884, like that of last year, was abnormally small, reaching a good many thousand short of an average year, and said to be the smallest catch ever known. During the season of 1883, 9 ripe fish were handled; during this season, 12 were handled; but of the 12 fish, ova were taken from only 6. The total number of eggs this season was 2,420,000. Of these, 1,535,000 were placed overboard in an impregnated state, the hatchery being unprepared for their reception, but of the 530,000 handled in the hatchery on May 12, and subsequently, 298,000 fish were hatched, showing a percentage quite creditable in work so new as this. At Weldon there were actually planted 280,500 fry.

It is my opinion that Weldon, N. C., is altogether a favorable place for hatching this species; as the falls which obstruct the river at this

point cause an accumulation of fish which are in better average spawning condition, perhaps, than an equal number of fish which may be found anywhere else in so small an area. If the total number of eggs handled this year could have been turned at once into the hatching jars, the result of the season upon the basis of 50 per cent would have been 1,210,000 fry.

The hatchery which was left behind is in first-rate condition, and everything favorable for future operations and in such readiness that in any other attempt there need be no risk whatever of losing any ripe spawn which may be procured there. As to the possibility of procuring this spawn, it may be well to say that the fishermen almost without exception, though they number more than one hundred, are in full accord with the work of artificial propagation, and are ready to lend every assistance in their power toward building up a permanent station at that place.

I have examined with considerable care the striped bass at the fisheries known as Calm Point, Kittyhawk, Mizell's, Rock Point, and others lying below, between the mouth of the Roanoke River and Jamesville, a distance of 25 miles, and also in large numbers those taken from the large seines just below the mouth of the Roanoke, and furthermore in the pound nets about Edenton, and have so far failed to discover any point approximating Weldon for the purpose of propagating these fish. It occurs to me that quite a great deal has been accomplished this season at Weldon in having discovered so many million of eggs in such a poor season, and furthermore in finding that the eggs may be successfully handled in the apparatus generally used to-day. As far as the keeping of the fry is concerned there is no difficulty; in former experiments I have found no difficulty whatever in keeping them alive in ordinary shipping cans a period of twelve days with moderate changes of water through the tin strainer tube. I feel gratified at the result at Weldon, and assure you, while my expectations were not fully met as to the number of eggs we should get, that I am entirely satisfied as to the result, and feel all confidence in any future labors at that point. I am glad to state that the citizens of Weldon themselves showed a ready and untiring interest in developing there a station unequaled in any other locality in which I have operated.

Before concluding this report it may be well to mention that while Weldon is a small town, containing only about 1,500 inhabitants, it is yet a very considerable railroad point, five roads terminating there. During the height of the season as many as two hundred visitors a day were welcomed to the hatchery; and during the season probably upwards of two thousand were received.

Table I shows the whole work in brief, and Table II the water and air temperatures during the period of actual operations.

RALEIGH, N. C., *June 11, 1884.*

NOTE BY MR. T. B. FERGUSON.—The report of S. G. Worth, superintendent of fisheries of North Carolina, on his striped bass hatching operations, conducted at Weldon, N. C., under the auspices of the United States Fish Commission, contains a matter of great importance to a large number interested in fisheries and in fishing who have anxiously looked for successes in this direction. As this fish is one of the most important and interesting of all the food-fish of the Atlantic coast, the possibility of arresting its alarming decrease has been looked forward to with great anxiety by many.

Mr. Worth's report is not so important as a record of work that has actually been accomplished as in having demonstrated the practicality of carrying on this important work at the point selected for these operations.

I have never doubted the ability of our experts in fish-culture to care for and develop with but slight loss the eggs of this fish. The difficulty has been in finding a place where the mature fish could be obtained with any certainty.

The Roanoke River near Weldon having proved to be such a locality, I cannot too strongly urge that immediate steps be taken for the establishment of a hatchery at this point, so equipped, and equipped in time for the next season's work, as to insure successful operations on a large scale.

TABLE I.—*Hatching and planting of striped bass or rock-fish at Weldon, N. C., 1884.*

[Under the direction of S. G. Worth, superintendent; C. M. McDowell, captain of the force.]

Date.	Weight of fish stripped.	Condition of ovaries.	Number of fish stripped.	Number of eggs taken.	Number impregnated eggs placed into Roanoke River at station. ^a	Number of fish hatched.	Number of fish placed in Roanoke River at station.
1884.	<i>Pounds.</i>						
May 2	15	Two-thirds spent.....	1	b200,000	100,000	.....	.....
2	42	Ovaries full.....	1	c1,150,000	1,125,000	.....	.....
6	11	One-third spent.....	1	d350,000	310,000	.....	.....
12	12	One-half spent.....	1	e240,000	.....	f36,000	36,000
16	15	One-third spent.....	1	60,000	.....	g42,000	34,500
17	14	Ovaries nearly full.....	1	420,000	.....	220,000	h210,000
Total.	.....	.....	6	2,420,000	1,535,000	298,000	280,500

^a The eggs represented by the numbers in this column were taken before the hatchery was ready and were kept on wet trays several hours before being released.

^b Eggs ten hours old when planted.

^c Twenty-five thousand of these were ten hours old when released. Part of the eggs were left in the ovaries.

^d Forty thousand of these were thrown away from lack of milk.

^e Of this lot 160,000, after impregnation, were upset upon the ground by a careless bystander, and 30,000 shipped to Washington, D. C., by express, coagulated and perished while in transit, and 10,000 were broken in handling those for express shipment.

^f The 36,000 fry hatched from 40,000 eggs.

^g There were kept 7,500 fry in an aquarium for inspection, where they gradually died, after some days' confinement.

^h The 10,000 fry unaccounted for were hatched from eggs on trays, where they were kept alive sixty hours by way of experiment.

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TABLE II.—Temperatures of air and water at Weldon, N. C., on Roanoke River, 1884, *during the propagation of striped bass.

[Under the direction of S. G. Worth, superintendent; C. M. McDowell, captain of force.]

Date.	Temperature of—					
	Air.	Surface water.	Air.	Surface water.	Air.	Surface water.
	7 a. m.	7 a. m.	12 m.	12 m.	7 p. m.	7 p. m.
April 20.....	59	60	58	60	54	58
21.....	56	62	54	58	52	56
22.....	49	54	48	54	48	52
23.....	48	52	48	52	48	52
24.....	50	52	48	52	50	54
25.....	49	52	54	56	56	58
26.....	50	52	62	63	59	62
27.....	55	57				
28.....	58	60	70	66	68	70
29.....	68	64	74	70	70	74
30.....	62	62	70	66	72	74
May 1.....	62	65	78	66	76	68
2.....	70	68	86	70	78	71
3.....	68	68	78	70	71	70
4.....	72	74	76	72	78	74
5.....	72	70	80	72	78	73
6.....	71	72	74	78	77	73
7.....	68	72	84	76	74	70
8.....	69	73	66	72	76	70
9.....	62	71	64	72	62	70
10.....	60	68	75	73	70	72
11.....	64	70	78	73	70	72
12.....	58	69	68	70	64	70
13.....	60	68	72	68	70	71
14.....	71	69	74	70	76	71
15.....	66	68	73	69	67	70
16.....	64	68	78	72	67	72
17.....	58	68	70	69	72	72
18.....	60	68	75	71		
19.....	62	68	81	82	78	84
20.....	72	72	78	74	76	71
21.....			78	78	84	74
22.....			80	74	84	74
23.....	73	74	90	78	90	78
24.....	75	76	82	78	84	78
25.....	76	78	82	80	86	82
26.....	71	76	70	76	78	76
27.....	66	74	70	74	71	73
28.....	66	68	73	76	70	73
29.....	52	63	64	78	64	70
30.....	52	62	60	68	68	72
31.....	54	62	65	70	75	72
June 1.....	58	60	68	68	65	71
2.....	54	62	63	67	75	71
3.....	58	62	73	73	80	73
4.....	64	66	74	75	85	78
5.....	68	68	77	75	84	76
6.....	70	70	80	72	84	75
7.....	70	68	84	73	80	75

* The water temperatures were taken in the canal, and not in the river proper.

123.—THE CARP PONDS BELONGING TO THE STATE OF TEXAS.

[From the Texas Farm and Ranch.]

The State fish-ponds at Austin, Tex., are now in a most flourishing condition, and the taste displayed in decorating the walks with flowers and shrubs, and other attractive improvements, reflects great credit upon the commissioner. The ponds are situated close to Barton's Creek (about two miles from Austin), from which they are supplied with cold spring water. There are four of these ponds, three of which are fully