# XXIII.—REPORT OF SHAD PROPAGATION ON THE POTOMAC RIVER DURING THE SEASON OF 1886.

#### BY MARSHALL McDonald.

The organization and conduct of the work was the same, in general, as during the season of 1885. The facilities for collecting eggs were greatly improved by substituting for the launch heretofore employed in the collection service the small steamer Lilla, chartered for the season, but at the close of the season purchased by the U.S. Fish Commission.

The eggs collected from the fishing-shores and gillers were transferred to the field station at Fort Washington, where they were kept and developed until hardened, so as to permit safe transportation to Central Station, Washington. Here the hatching was completed, and the distribution of the fry conveniently made by car and messenger service. Several million eggs were retained and hatched at Fort Washington for stocking waters in the immediate vicinity of the station.

## COST AND RESULTS OF THE WORK.

For the conduct of the work, in accordance with the program submitted and approved, the Commissioner authorized an expenditure not to exceed \$5,000. At Fort Washington Station the actual cost of collecting, developing, and transporting the eggs was \$2,879.90; at Central Station, for hatching and distribution, \$916.55; total, \$3,796.45. The total number of eggs obtained was 36,362,000, and the losses during incubation were 6,625,000, leaving the aggregate number furnished for distribution from the Potomac River stations 29,737,000. The percentage of loss during incubation was 18 per cent, and shows marked improvement over the results of previous seasons. The cost of production was \$127.66 per million, or 78 shad for each cent of expenditure.

## FORT WASHINGTON STATION.

On March 26 the station was occupied by a small force. The men were employed in tarring and rigging the seine, cleaning up the shore, and getting everything in readiness for active work when the run of shad should begin.

The first haul of the Commission seine was made April 12, and the first ripe fish was taken on the 16th. The run of fish steadily increased from that time to the 22d, as did also the proportion of ripe females. On the afternoon and night of the 22d of April 3,503,000 shad eggs were taken and impregnated. This was the maximum number taken in one day during the season. The period of maximum production was from April 20 to 27, inclusive; the total production for the period referred to being 16,017,000, or nearly one half of the entire number obtained during the season.

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The eggs which were hatched and planted in local waters (3,154,000) and forwarded to Central Station (33,208,000) were derived as follows:

From the Fish Commission seine at Fort Washington	5,506,000
From Ferry Landing hauling-seine From White House hauling-seine From Stony Point hauling-seine	1 487,000
From the gillers	10, 981, 000
Total	36, 362, 000

The records of the Commission seine fished on the Fort Washington reservation have been carefully kept, and are here published, so as to preserve important data in a shape accessible to fish-culturists generally. These show the fluctuations from season to season, not only in the aggregate catch of shad on the same shore, but also the variations in the proportion of males to females, in the time of maximum run, and in the date at which the proportion of ripe fish reaches its maximum, and the interval during which the largest numbers of eggs are taken.

Record of scine-hauling at Fort Washington shore during the season of 1886.

Date.	Number of shad.	Males.	Females.	Ripe females.	Eggs taken.	Temperature of water during impregnation.	Date.	Number of shad.	Males.	Females.	Ripe females.	Eggs taken.	Temperature of water during impregnation.
April 15* 10 17 18 19 20 21 22 23 24 25 26 27 28 29 30† May 1† 3† 4 5 6† 7† 8t 9†	2 85 116 116 150 264 2100 264 2100 264 103 258 258 264 103 258 185 186 177 106 88 289 202 207 179 202 248 111	1 68 88 88 111 201 129 164 194 62 112 203 108 99 122 97 121 188 178 139 199	1 27 28 30 63 63 67 74 100 41 188 1568 80 64 45 44 40 58 30	3 1 1 9 5 6 11 127 15 20 20 18 15 7 3 2 0 5 1 10 5 5	95, 000 40, 000 7, 000 205, 000 814, 000 211, 000 881, 000 767, 000 492, 000 705, 000 404, 000 404, 000 404, 000 21, 000 21, 000 114, 000 245, 000 149, 000	61 65 63 660 69 70 68 67 62 63 664 64 63 66 60 60 60 60 60 60 60 60 60 60 60 60	May 10: 11: 12: 12: 13: 15: 16* 16* 17: 17: 18: 10: 20: 21: 22: 23: 24: 25: 20: 27: 28: 29: 30: 31: June 1**	150 467 234 188 2 215 179 296 170 144 164 130 65 109 109 109 104 86 75 81 5	130 885 199 159 2 195 154 195 124 102 88 80 60 60 55 19 3	200 83 85 29 0 20 25 101 46 88 48 62 44 21 20 12 20 20 25 25 26 27 28 28 29 20 20 20 20 20 20 20 20 20 20 20 20 20	7 13 17 8 0 8 2 24 11 0 24 22 10 4 11 5 4 12 3 6 0 0	180,000 385,000 548,000 211,000 65,000 824,000 011,000 050,000 294,000 111,000 389,000 110,000 115,000	63 62 64 63 61 63 63 63 63 65 66 67 71 70 71 69 69

<sup>\*</sup>Seine hauled but once.

One haul omitted.

No hauls, on account of the high wind or heavy current. Current lighter and running down very fast. Rain all day.

New current beginning to run.
\*\*Cut seine out after first haul.

 $\Delta$  comparison of the records of the seine-hauling in 1885 and 1886, for which seasons only we have reliable records, affords contrasts as interesting as they are perplexing. These may be summarized as follows:

Years.	Total catch.	Males.	Females.	Ripe females in total cutch.	Ripe females to cutive number of females.	Maximum production of eggs for entire river.		
						Date.	Period.	
1885 1880	2, 696 7, 419	Pr. ct. 45. 7 71. 8	Pr. ct. 54. 3 28. 2	Pr. ct. 9, 0 5, 3	Pr. ct. 17. 0 14. 1	May 16 Apr. 22	May 5-11 Apr. 20-27	

A considerable proportion of the excess of males was made up of small two-year-old "buck shad," called by the fishermen "skimmers," which, being too small to count, are sold by the bunch. The preponderance of these during the season gives promise of an increased run of full-sized spawning fish in 1887.

Transportation of eggs.—The transfer of impregnated eggs from Fort Washington to Central Station was made by the steamer W. W. Corcoran, plying daily between Washington and Mount Vernon, the transportation being uniformly made on trays, by the "dry method," inaugurated by me in 1881. The total number of eggs forwarded from Fort Washington Station was 33,208,000. Of these 4,925,000 died in transit.

#### CENTRAL STATION.

The total number of eggs received in good condition, the number of eggs and fry distributed, and the average percentage of loss in hatching are given in the following summary for the season of 1886:

Eggs transferred to other stations	1,586,000 24,997,000
Eggs lost in hatching, 7 per cent	1,700,000
Total eggs received alive from Fort Washington	

The records of the station contain a history of each lot of eggs received from the Fish Commission seine, giving the temperature of impregnation, the maximum, minimum, and mean of water temperatures during the period of incubation, and the percentage of loss in hatching, data which it is important to preserve for reference, but which it is hardly necessary to publish.

Comparison of the catch of 1885 and 1886.—The catch of shad in the Potomac varles greatly from one season to another. The aggregate number \* taken in 1885 was 157,697; in 1886 it was 275,422, the increase of 1886 over the previous season being 117,725.

<sup>\*</sup> See reports of Gwynn Harris, inspector of marine products, in U. S. F. C. Bulletin, Vol. V, p. 192, and Vol. VI, p. 202.

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