106.—THE INFLUENCE OF ARTIFICIAL PROPAGATION UPON PRODUCTION ILLUSTRATED BY THE SALMON WORK OF THE SACRAMENTO RIVER, CALIFORNIA.

By CHAS. W. SMILEY.

It is understood that about four years are required for salmon to mature. I would therefore place the yield of 1877 opposite the planting of 1873, and so on. For four successive years the yield has been nearly double the yield of the years preceding the artificial propagation, which commenced in 1873. This appears to have resulted from annually planting about two million fry. The planting of 500,000 fry in 1873 and in 1874 appears to have increased the yield by about a million pounds each year. No record of the production in Sacramento River prior to 1875 is obtainable, but it is known to have been less than six million pounds.

Young salmon hatched from eggs taken by the United States Fish Commission and released in the McCloud River, a tributary of the Sacramento, in California.

Year.	Month.	Number.	Year.	Month.	Number.
1871		None.	1878	October	2,500,000
1872		None.	1879	October	2,000,000
1873	September	500,000	1880	October	2,000,000
1874	September	500,000	1881	October	2,250,000
1875	September-October	850,000	1882	October-November	4,037,000
1876	September-October	1,500,000			
1877	October	2,200,000			18,337,000

Annual yield of the Sacramento River in salmon to the canneries.

Year ending—	Pounds.	Year ending—	Pounds.
August 1, 1875	5,098,781	August 1, 1880	10,837,400
August 1, 1876	5,311,423	August 1, 1881	9,600,000
August 1, 1877	6,493,563	August 1, 1882	9,605,280
August 1, 1878	6,520,768	October 15, 1883	9,585,672
August 1, 1879	*4,432,250		67,485,137

* The salmon were as numerous in the river this year as in any previous years, but the small number taken was due to a feud between the fishermen and the canners as to the price to be paid for the fish. For three weeks in the height of the season no fish were taken, except for daily consumption in San Francisco and other markets.

	Pounds.
The average yield during the past three years was	9,596,984
The average yield in 1875 and 1876, before any fruits of fish-culture could have appeared, was	5,205,102
Making a gain per annum due to fish-culture of	4,391,882

The fish are worth 50 cents apiece as they come from the water, their average weight being 7 pounds each.

Value of the 4,391,882 pounds due to fish culture	$313, 706 00
Cost of hatching and planting 2,500,000 fry	3, 600 00
Annual net profit	310, 106 00

The expenditures by the United States Fish Commission on this work and the number of eggs obtained from 1877 to 1882 were as follows:

Fiscal year.	Amount expended.	Eggs produced.
1877–'78	$7, 853 96	7, 033, 000
1878–'79	12, 730 54	10, 310, 000
1879–'80	12, 875 55	6, 650, 000
1880–'81	13, 587 20	5, 800, 000
1881–'82	6, 653 51	7, 500, 000
Total	$53, 700 76	37, 293, 000

Average cost per million eggs, $1,440.

This expenditure was greater than would be necessary merely to increase the supply of fish in the river. Of the 37,293,000 eggs obtained during these five years but 11,000,000 were used to produce what young were returned to the river. The other 26,293,000 eggs were sent to the Eastern States and to foreign countries. Additionally, the experience of the past will enable the commissioners to exercise greater economy. One of the California commissioners stated to a committee of the legislature that "a million of salmon could be artificially hatched and placed in the river for less than $800; and if it were desirable, and the legislature made sufficient appropriation, the commissioners *could fill the river so full of salmon that it would be difficult for a steamboat to pass through them.*" Considering the fact that food does not have to be furnished, these fish, coming from their ocean feeding-grounds to the rivers, as they do, merely to spawn, his statement may be within the bounds of reason.

Writing under date of January 6, 1882, Mr. B. B. Redding, of San Francisco, Cal., said: "Since we commenced putting young salmon into the Sacramento, Pitt, and McCloud Rivers the number of canneries with money invested *has more than trebled*, and more persons are investing money in new canneries. Requests are coming from other parts of the State to have salmon hatched. Fish-hatching, for the purpose of supplying food, has at length become popular."

U. S. F. C., WASHINGTON, D. C., *April* 15, 1884.