

## XXXVIII.—DO THE SPAWNING SALMON ASCENDING THE SACRAMENTO RIVER ALL DIE WITHOUT RETURNING TO SEA?

BY HORACE D. DUNN.

[With notes by Livingston Stone.]

A.

[Communication from San Francisco, Cal., September 26, 1876.]

Prof. SPENCER F. BAIRD,

*Assistant Secretary Smithsonian Institution, Washington, D. C.:*

SIR: I am the author of the article lately published in the San Francisco Bulletin on fish-culture, which was sent to you by B. S. Redding, esq., fish-commissioner of the State of California. Mr. Redding has kindly loaned me his copy of the United States Fish Commission Report, 1872-'73, and at his suggestion I write you. I have been a resident of California since January, 1850, and during the last ten years have taken great interest in its fisheries. As a consequence I have been much interested in the article of Mr. Livingston Stone on the Sacramento salmon in the report. In some particulars my experience differs from that of Mr. Stone, and on this account Mr. Redding has asked me to write to you.

On page 180, Mr. Stone states that all the Sacramento salmon die after spawning. No doubt great numbers do, but a very large portion of the run return to sea again, as before the close season between August 1, and November 1, was established it was a common occurrence to find spent salmon in market between the dates named. These salmon were very much emaciated, had no scales, and varied in color from a rusty black on the backs to a faded brown on the belly. Some were of a dirty white color all over, as if they had been parboiled.

In regard to the quality of the Sacramento salmon, I think they compare favorably with those caught in Maine. The mode of treatment here of salmon is simply barbarous. The fish are caught in drift-nets in the Sacramento River, near Rio Vista, about eighty miles from this city. They, as a rule, lie in a boat for several hours exposed to the sun before being brought to the steamer's wharf. There they lie in large heaps for several hours more, and are dragged on board and put in large heaps again. At San Francisco the fish are dragged ashore and roughly thrown into wagons, and on arrival at the markets experience the same treatment again; as a consequence, the salmon have been dried and heated and much bruised before they are sold to the consumer, and their

flavor and firmness of meat much impaired. Treat the Maine salmon in the same way and its best qualities would be gone.

Our salmon do take bait readily in the salt water at the mouths of rivers and creeks, and in the bays along the coast. At such places fly-fishing is generally not successful.

I have had several conversations with Mr. Redding about his observations of the San Joaquin salmon and of your desire to procure a species of salmon that can be successfully introduced into the waters of the States south of the Potomac. It seems to me that the San Joaquin salmon will not be as good for such purpose as the salmon which frequent the rivers which empty direct into the Pacific along the California coast from Monterey north. This last variety makes its appearance at the mouths of the coast streams from the middle of October to November, awaiting the annual winter rains to swell the streams, up which they go to their spawning-beds. The spawning takes place in December and January, the spent fish returning to the ocean in February and March. These fish, in good condition, have been caught weighing 25 pounds. As salmon spawn at set times, regardless of change of location, the coast species would arrive in the rivers of the Southern States when the streams would be swollen with winter rains, the water of a low temperature, and such enemies as blue-fish, Spanish mackerel, &c., withdrawn to warmer waters near the Florida coast. The rivers, also, being higher than in summer, would, with the colder weather, insure the salmon a better chance for successful spawning than would be the case with the San Joaquin salmon, which would be in the rivers in August and September, and easily caught, which is not desired until the rivers become fully stocked.

I would also call your attention to a fish commonly called salmon-trout, which visits our coast rivers about the same time the salmon do, probably two weeks later. This fish is trout-shaped, being longer and rounder than the salmon, and of proportionately less weight. This fish spawns as late as February, and possibly early in March, after which they return to the mouths of the streams and to the ocean in the early part of April. They have been caught weighing 20 pounds, from 8 to 10 pounds being a common weight. I think this variety would do well if introduced into Virginia and the two Carolinas. They are a very game fish, flesh before spawning a faint cream-color, changing to white when returning to sea. A 7-pound fish in good condition measured 31½ inches long, while the largest run to about 40 inches. This variety of fish stock the coast streams, where the mountain trout have been completely fished out. They are, however, fast disappearing under the effects of netting, giant-powder, and spearing, and promise to become extinct within the next ten years unless protected by law from such dangers.

Apologizing for so long and disjointed a letter, I remain your obedient servant,

HORACE D. DUNN.

## B.

[Notes on letter of Mr. Horace D. Dunn to Prof. Spencer F. Baird, dated San Francisco, September 26, 1876. By Livingston Stone.]

In the first part of his letter Mr. Dunn says that on page 180, United States Fish Commission Report, 1872 and 1873, Mr. Stone states that "all the Sacramento salmon die after spawning," and criticises this statement as follows:

"No doubt that great numbers do, but a very large portion of the run return to sea again, as before the close season between August 1, and November 1, was established it was a common occurrence to find spent salmon in market between the dates named."

Now, Mr. Dunn, undoubtedly without designing to, has misquoted what I said. By referring to page 180, of the report referred to, it will be seen that I did not say that *all* the Sacramento salmon die after spawning, but limited my statement to the salmon of the McCloud River. Indeed, in reference to the *Salmo quinnat* dying in the California rivers I took particular care in my report to say that my remarks applied only to the salmon of the McCloud and upper tributaries, because these salmon I was familiar with, while I was not familiar with the habits of the Sacramento salmon of other portions of the river. The exact words of the statement on page 180, of the report are as follows:

"Soon after this they (the salmon) become foul, diseased, and very much emaciated, and in the McCloud River, at least, they die a short time after spawning."

This statement I am prepared to support by evidence collected since that time, and by the testimony of many others who have had opportunities of observing the McCloud River salmon with particular reference to this peculiarity.

The fact further mentioned by Mr. Dunn in confirmation of his statement that spent salmon were frequently seen in San Francisco in the fall is no evidence in regard to the McCloud River salmon, for no salmon in any stage were ever sent from this river to the San Francisco market, while it is a fact within my own knowledge that spent salmon were formerly sent to market from the vicinity of Cloverdale and also from Tehama. My own opinion on the subject, confirmed by five seasons' observation on the McCloud River, is that the Sacramento salmon which spawn near the sea are, many of them, able to return to the salt water, but that the salmon which spawn as far away from the ocean as the McCloud River and upper tributaries of the Sacramento are too much exhausted after spawning to find their way back to the sea alive.

The remarks of Mr. Dunn, farther on in his letter, in regard to the quality of the flesh of the Sacramento salmon, and also in regard to taking them with a hook and line, I entirely agree with and approve of. I do not, however, attach as much importance as Mr. Dunn does to the

distinction which he makes between the coast salmon of California and the San Joaquin salmon. He says that the coast variety is better than the San Joaquin fish for introducing into the Atlantic rivers of the South, because they spawn in December and January, which would be more favorable months for the salmon to ascend the rivers in.

Now, I am inclined to think that the coast fish are the same variety as the San Joaquin fish, and that salmon do not spawn at set times, regardless of change of location, as Mr. Dunn asserts.

On the contrary, I think that the spawning season is a mere accident of place, and that if the California coast salmon should be introduced into the Atlantic rivers they would adopt a time for spawning suited to their new location which would be entirely independent of the season at which their progenitors spawned on the Pacific coast, and consequently it would make no difference as far as the favorableness of their spawning season was concerned whether it was the coast salmon or the San Joaquin salmon that were introduced.

The suggestions in regard to the introduction of the California salmon-trout into Eastern waters, with which Mr. Dunn closes his letter, is, I think, a very valuable one. This fish, the local name of which is salmon-trout, is a large and excellent variety, and is certainly fast disappearing. If it is not practicable at present to transport any of them to the Atlantic States, some effort ought to be made at once to, at least, protect and increase them where they are.

In conclusion I take the liberty to say that Mr. Dunn's contributions on fish-culture to the newspapers have been of a high order of merit, and rank among the best specimens of newspaper literature on the subject.

LIVINGSTON STONE.