

question, and the late Frank Buckland, in some notes in which he bitterly opposed the pollution of rivers wrote:

'How very important, then, is it to keep pollutions out of salmon rivers; they may not be actually strong enough to poison or kill the fish, yet it is very likely they will deter many from ascending the river.

I think different fish must have different powers of smell; thus gudgeon, roach, &c., assemble at the mouths of drains—the largest I ever caught was in the drain that carries the abominations of the town of Winchester down into the river. Scavenger fish, therefore, I dare say, would not care much about stinking water, but the lordly salmon will not put in an appearance in localities where his 'regal nose is likely to be offended by unsavoury smells.'

The presence of small species of fish indicates the presence of microscopic food, and if that kind of food be present there is little doubt that the young salmon, if the upper waters be kept pure and unpolluted will survive their journey down to the sea when one or two years old.

On the whole therefore it cannot be maintained as proven that such pollutions as sawdust are seriously detrimental to the ascent and welfare of adult fishes. In the North-west Territories certain coal mines have begun to pour out dust and coal refuse into tributaries of the Bow River and other trout waters. It remains to be seen what kind of injury, if any, will be done to the various species of trout frequenting the rivers flowing from the Rocky Mountain Range.

Certainly it is hardly possible that any rivers in the world are more densely charged with physical impurities than the Fraser, the Skeena and other Pacific rivers. The muddy character of these great rivers always surprises the visitor, who has heard of their pre-eminence as salmon rivers, and the ideal salmon rivers are sparkling crystal waters. These Pacific rivers are vast streams of dilute yellowish brown mud. No contrast could be greater than that of these western salmon rivers and the bright and clear waters of Eastern Canada, or of Scotland and Ireland. Yet the physical impurities of the Pacific rivers have no apparent effect upon the fish, which blindly push their way up the beclouded current until they reach the purer upper waters. The fish can practically see nothing in their ascent, nor can they be seen by man except in some shallow eddy, where their black backs are visible protruding from the mud-laden water in which they are living. The muddy character of these salmon rivers enables great quantities of floating drift-nets to be used, and the schools of fish in their endeavour to ascend push their noses against successive walls of nets and as the meshes become filled with noosed fish, the rest descend and pass under the net only to mesh in the next net further up, and only those which pass net after net in this way reach the waters above fishing limits and continue their ascent up the descending murky current for hundreds of miles. These rivers are fed by tributaries which pour through channels of gravel, gravel famous for the rich intermixture of gold, so that the waters are yellow and turbid for great distances and it is only in the lakes and small upper tributaries that the water is free from diluvium.

The evil effect of this diluvium and of deposits of sawdust falling upon spawning grounds must be admitted, and the killing off of fish-food is another serious aspect of the matter, though this latter question, as already pointed out, is of minor account in regard to salmon rivers. An illustration of the alleged far-reaching effect of sawdust pollution may be found in the Bay of Fundy. In the vast upper stretches of this bay immense schools of 'fall' shad resorted in August to feed. The food, it was generally thought consisted of annelids or shad-worms. In recent years the shad have fallen off so seriously that the fishery is of little account compared with its former extent and value. Sawdust it is claimed floating out of the mouths of New Brunswick and Nova Scotia rivers, has been deposited by the tides upon the feeding grounds, and the shad-worms or food of the shad has been destroyed. This may or not be the case, though I have seen the surface of the sea in the Bay of Fundy covered for many miles with floating sawdust; but it must also be remembered that overfishing in the rivers in spring, when the shad are ascending to spawn, the stoppage of their ascent by dams, etc., must have had some effect, while the ruthless