

40.—FREEDOM OF MIGRATION FOR FISH IN GERMANY.*

By H. KELLER.

Thus far the German Fishery Association has mainly devoted its activity to the promotion of artificial fish-culture and to the stocking of our waters with young fry. Millions of young salmon had been placed in those watercourses that seemed to offer a guarantee for their future well-being. These fish have flourished, but unfortunately they do not return. All efforts to regain our former abundance of fish will not reach the object in view until the migratory fish again have free access to their spawning places, and until they everywhere enjoy full protection during the spawning season. If the German Fishery Association has been less active in this direction, the reason for this must be sought principally in the circumstance that the great difficulties can be conquered only by aid of a determined and persistent support from public opinion; and this applies especially to the difficulties which at present are still opposing the unhindered migration of our fine food-fish.

How small do the results of the salmon fisheries of the Rhine—at present counting only by hundreds—appear when compared with the results of these fisheries during the Middle Ages, when it became necessary to protect the apprentices and servants at Cologne and Mayence by an official decree against being compelled to eat Rhine salmon during the season every day, both for dinner and supper! In those times the headwaters of the tributaries of the Rhine, which possess an abundance of excellent spawning places, were not yet cut off by weirs. We have evidence that in former times the tributaries of the upper Moselle, the Lahn, and the Neckar were full of salmon and sea-trout. Now these streams, from which the Rhine received its supply of fry, are inaccessible to the spawning fish. Every new weir constructed in the Vosges Mountains and in the Westerwald has cut off a portion of our salmon, until but faint traces of their former abundance remain. The worst enemies of the migratory fish of the Rhine do not dwell near its mouth but near its headwaters. It is the weirs which make the natural spawning places of the salmon inaccessible, and therefore prevent the increase of this fish. The condition of affairs is still more deplorable in most of the other streams of Germany, many of which have weirs in the middle portions of their course, weirs so high that the salmon can leap over them only under specially favorable circumstances.

* "*Die Freizügigkeit der Edelfische.*" From Circular No. 1, 1886, of the German Fishery Association, Berlin, March 4, 1886. Translated from the German by HERMAN JACOBSON.

Matters are no better in the neighboring countries. We learn the condition of France in this respect from the reports of the "Commission for restocking the French waters," appointed a few years ago by the senate, which, after very careful investigations, has reached the conclusion that, owing to the construction of numerous weirs, the migratory fish have nearly disappeared from the rivers of northern and western France, which, in former times, were full of salmon.

Across the Atlantic we hear the following complaint from the United States: "It is an established fact that our river fisheries have for a number of years decreased steadily, both as regards the quality and the quantity of the fish caught. In some cases certain kinds of fish which formerly were abundant have disappeared entirely. More especially has the number of migratory fish decreased to an alarming degree. The construction of weirs in our rivers has entirely cut off some species of fish from their spawning places, so that their complete disappearance is only a question of time."

The only country where the wealth of fine migratory fish is not on the decrease, but actually increases from year to year, is Great Britain. In England, even among the middle and lower classes, good meat forms a staple article of food, much more so than in Germany. It is well known that, as regards their nutritive qualities, fresh fish do not rank much lower than meat, and are even preferable for people with a weak stomach. From the instructive treatise by the Duke of Edinburgh "On the sea fisheries and the fish of the United Kingdom," we learn that the average annual quantity of fish consumed by every citizen of London is upwards of about 66 pounds, and so about as much as the quantity of beef consumed. The citizen of Berlin has to be satisfied with an annual average quantity of about 9 pounds; while in Vienna, on the banks of the beautiful blue Danube, the average quantity of fish per capita is only about $2\frac{1}{2}$ pounds. Although the fish found in the Billingsgate fish-market in London are principally salt-water fish, the finer river food-fish are also offered for sale in considerable quantities. The price of salmon and sea-trout is low enough to allow these excellent fish to be seen frequently on the tables of the middle classes.

The undeniable fact, that in no country of the world—Canada perhaps excepted—do the fisheries of migratory fish flourish more than in Great Britain, might at first thought be cited as an argument against the hurtful influence of weirs on the fish; for it is well known that Great Britain has made her watercourses from the source to the mouth subservient to industry and navigation by the construction of numerous weirs. If, in spite of this, British salmon fisheries are very productive, the cause must be found principally in the successful efforts of intelligent men to protect the salmon during the spawning season, to introduce rational methods of fishing, and to make the weirs passable. In Great Britain public opinion has declared in favor of an active support of the fisheries much sooner and more generally than on the continent.

Selfish scruples of the owners of weirs, and the anxious doubts of the over-cautious, had to give way before the clearly expressed wish of the majority, which recognized the economical importance of all efforts tending to promote the fisheries.

About forty years ago the rivers of Great Britain, formerly rich in fish, had become depopulated in the same degree as the German streams are now. Especially had the number of migratory fish decreased everywhere to an alarming extent. At that time public attention was directed to the matter of the fisheries, especially to the construction of artificial fishways for passing the weirs, whose height, in connection with the strong current, prevented the fish from passing over them. Numerous coast streams were in the course of years regained for the salmon. The same was done with the larger rivers, such as the Severn, whose tributaries, up to the headwaters in North Wales, have been supplied with fishways. The example of the small Irish river Corrib may serve as an illustration of the results of these efforts. When the fisheries in that river, in the year 1852, passed into the hands of the present owner, they were almost worthless, as the migratory fish could not leap over the weir near Galway. After a fishway had been constructed, and numerous measures had been taken to protect the young fry set out above the weir, the salmon fisheries increased very rapidly. In 1857 about 5,000 salmon were caught; in 1862, upwards of 15,000; and for a number of years the average annual yield of these fisheries has been from 40,000 to 50,000 fish.

These brilliant results have caused people to make even those water-courses accessible for the salmon from which it had hitherto been excluded by natural obstructions. As an example, we may mention the river Ballysadare in Ireland, which up to 1856 had no migratory fish, on account of its falls (from 13 to 20 feet high) and its rapids. But after three fishways had been constructed, and the gravelly beds of the headwaters had been stocked with salmon fry, the number of fish increased very rapidly. Thousands of the finest salmon annually reward the enterprising owner. But this is outdone by an example from Norway. A few years ago the river Sire, having two falls—one 28, the other 88 feet high—was by means of fishways made accessible for salmon. Who can doubt, then, that it is possible to gain the rapid trout-brooks of Switzerland as spawning places for salmon, as the height of the famous falls of the Rhine near Schaffhausen is only about 66 feet?

The few instances where German weirs have been made passable for salmon can easily be counted on the fingers. There are a few successful fishways, and a number which hardly answer the purpose. This is not astonishing when we consider that the subject is somewhat new, and but few of those who constructed fishways in Germany had a chance personally to inspect such constructions in other countries. Actual results cannot be recorded, because these efforts have so far been disconnected and have not embraced entire river territories. At present it

still rests too much with persons who possess the privilege of constructing weirs across rivers, whether a fishway shall be constructed to make their weirs passable for fish. Owners of weirs claim almost incredible indemnities whenever they think that their privileges are going to be infringed in the slightest degree. As a matter of fact, the fishways will in nearly all cases receive an abundant supply of water from the overplus of water from mills, &c. The objections which have been raised against the construction of fishways are, therefore, in most cases based on too great timidity, and on lack of information and experience.

41.—A LARGE CATCH OF CARP.*

By MAX VON DEM BORNE.

During the winter of 1885-'86, by fishing through the ice in the Rosskamp Lake (which belongs to me, having an area of $10\frac{1}{2}$ acres and a depth of 16 feet), I caught 235 carp, weighing $923\frac{1}{2}$ pounds; and in the Bötzen Lake (which I lease, having an area of $151\frac{1}{2}$ acres), I caught 1,536 carp, weighing 5,715 pounds. Among these there were fish weighing more than 10 pounds. My other lakes also have a very good stock of carp, while formerly this fish was not found there at all, and the first stocking of them with carp was in 1871.

As a general rule, during the first years I put in 100, and later 50 one-summer-old carp to one acre of water, usually transferring the fish in autumn, when the carp were about five months old; but sometimes in spring, when the fish were about ten months old. As the lakes contain a great many pike, perch, and bass, many of the young carp were destroyed, but nevertheless a good many grew up to be fine food-fish, as may be seen from the catch stated above. I have also, instead of the one-summer-old carp, set out two-summer-old fish, and obtained the same results from about half the number of carp set out. I prefer, however, to set out younger fish, because it requires at least three times as large a pond area to raise two-summer-old carp.

As a general rule, I consider it a very easy matter to stock a lake with carp. But, on the other hand, it is often very difficult to catch the carp. In summer they are quick and shy, and at that time it is difficult to catch a large fish. But even in winter, during the fishing through the ice, the carp know very well how to avoid the nets, especially when the ice is transparent and the weather clear. In the Bötzen Lake I did not succeed in making any satisfactory hauls until I had enlarged my net so as to catch all the fish in a single haul. And the rich haul of this year I made by setting the net during the night by torchlight, and by having it taken out in the morning.

* "*Ein glänzender Fischzug.*" From Circular No. 1, 1886, of the German Fishery Association, Berlin, March 4, 1886. Translated from the German by HERMAN JACOBSON.