would make a cheap, durable, and either fragile or soft surface.* If I have an opportunity next spring, as I expect to have, to try it, I will do so, and report the result to you as soon as the spat is large enough to make removal desirable. Comparison can then be made with removal from surfaces otherwise prepared, or natural.

GREEN CREEK, CAPE MAY COUNTY, N. J., *September* 30, 1883.

183.—TRAPPING KINGFISHERS, RODENTS, AND OTHER ENEMIES OF TROUT.

By DIRECTOR HAACK.†

The question whether large central fish-cultural establishments or numerous small ones, if possible located close to the waters which are to be stocked with fish, should be aimed at has been answered so decidedly in favor of the latter that it will hardly be necessary for me to discuss this question. I will here only cite some illustrations from my own practice, in order to give a clearer idea of the danger of concentrating large masses of fish within a comparatively small space.

It is well known that the French administration of the Huningen establishment did not devote much attention to the raising of the finer kind of food-fish, or, for that matter, of other fish, its activity mainly consisting in shipping impregnated eggs. I suppose that all are fully aware how extensively fish-eggs were shipped, and in what a liberal manner the French administration distributed entirely free the products of its establishment far and near.

When I took charge of this establishment thirteen years ago it was one of my first objects to give some attention to the raising of the finer kinds of food fish, it being my aim to transform the Huningen fish-cultural establishment into an institution where fish-culturists might study the treatment of the finer kinds of food-fish from the egg to the salable fish. One of my first steps was to construct a ditch about 1 kilometer (about 1,100 yards) in length for raising trout; this ditch, imitating as near as possible a natural trout-brook, was to receive the young trout as soon as the umbilical sac had been almost consumed. In the very first year I met with good success, as I was able to take from this ditch in autumn several thousand finely-developed trout. During the second year the result was still more favorable, because I had greatly improved the ditch. This ditch receives its water from a small trout-brook, the Augraben; the fish were invariably placed in it some time before the umbilical sac had been entirely absorbed.

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* The cost of pitching surfaces and detaching spat afterwards will probably be too expensive in practice, in view of the fact that sowing shells can be so cheaply done.—J. A. RYDER.

† *Central-Fischzuchtanstalten oder zahlreiche Kleinere Anstalten?* From Circular No. 4, 4, 1884, of the German Fishery Association, Berlin, June 30, 1884. Translated from the German by HERMAN JACOBSON.

In the autumn of 1873 I took from my ditch 15,000 trout about the length of a man's finger, some even as long as a hand. In 1874, however, the number of trout decreased, and this decrease continued until I was on the point of ceasing to place young trout in the ditch. In spite of placing in it a large number of trout, I finally did not take more than a few hundred from it in autumn. I also found that the increase of the enemies of fish kept step with the increase of the fish. Kingfishers, which formerly had appeared only occasionally, soon came in great numbers, and of course did great damage to the trout in the open ditches. I managed, however, to keep them under proper control by following the advice of Max von dem Borne, and placing along the ditches a large number of the excellent kingfisher traps manufactured by Adolph Pieper, in Moers. At present, numerous kingfisher traps are placed along all my trout brooks and ponds, and a kingfisher which comes in this neighborhood is sure to be caught within a few days. In spite of this, the raising of young trout seemed to languish. Occasionally the results were somewhat more favorable, but I never again reached even approximately the large numbers of the first years.

Three years ago I ascertained that a large number of shrew-mice (*Wasserspitzmäusen*) had found their way into my brooks. For a long time all my efforts to master these little animals, which are well-known enemies of the eggs and young of fish, proved in vain, as I did not succeed in finding a suitable trap for catching these mice. One of my Alsatian neighbors, to whom I confided my trouble, advised me to try a very simple wire-spring trap, which he had successfully used for catching common mice. The first attempt made last year proved successful, and this year I procured two hundred such traps, which I distributed along my brooks and ditches. The result was perfectly surprising. Since April 1, 1884, therefore, in five weeks' time, I have caught with these traps 86 shrew-mice and 8 water-rats. The trap closely resembles Pieper's kingfisher trap, only it is constructed in a much lighter manner, and does not have the little board in the center on which the kingfisher alights. Above the spring there is a small contrivance to which bait can be attached. For bait I use a small piece of fish. These traps are manufactured by Schmerber Brothers, of Mulhausen, in Alsace, and cost only 25 marks [$6] per hundred. In every one of the shrew-mice which I dissected I found a considerable quantity of indigested and half-digested young trout—in some as many as 10. No further proof is needed to show that a number of these mice is sufficient to depopulate a well-stocked brook in a comparatively short time.

I believe that now I am master of the situation, for during the last few months shrew-mice have been caught only occasionally. My brooks at present again swarm with young, strong trout, and it remains to be seen whether some new enemy will make its appearance and prevent too great a production of fish within a narrow space.

HUNINGEN, ALSACE, GERMANY, 1884.