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THE IMPROVEMENT OF TROUT STREAMS

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By the improvement of trout streams we mean the conservation and upbuilding of the trout fishing. There are four means of increasing trout production.

Firstly, trout may be introduced into waters in which they are not native. This has been done in Michigan, with great success from the standpoint of trout fishing. The most famous brook trout streams of the state, such as the Pere Marquette, Manistee, Boardman, Au Sable, Au Gres, Rifle, and others, were devoid of trout within the memory of old lumbermen and settlers still living. They contained no trout until they were introduced in the seventies and eighties. And of course the rainbow trout, native to our Pacific Coast, and the brown trout, native to Europe, were introduced. This first, simple method of improving trout streams, or rather making trout streams, has been carried well toward its limit in Michigan, for trout of some species occur in nearly every stream of Michigan capable of supporting trout life.

Secondly, trout conditions may be improved by giving protection to the trout during the breeding season, in nursery waters, etc. Thirdly, the trout supply may be maintained in large part by giving protection to the eggs and fry by the methods of fish culture. With intense fishing, regulatory measures are necessary, to prevent serious depletion of the stock, and hatchery and rearing-station operations are an important means of adding to these stocks. The diligence with which these two methods of trout improvement have been developed and expanded by our State Department of

Conservation is reflected in the relatively satisfactory condition of trout fishing at the present time, following years of very heavy fishing.

But it becomes increasingly difficult each year, to conserve the trout supply, that is, to hold it on a level. If much progress is to be made, going beyond mere conservation, in actually increasing the trout supply in the face of ever growing depletion, we must turn our attention, we believe, to the improvement of living conditions for the trout.

Thus we come to the fourth method of adding to the trout supply, and the one which is most truly and specifically the improvement of trout streams. This is in our opinion not only feasible but also necessary. Neither introduction, nor portection, nor stocking, can grow fish. To do this a suitable environment is required. Without proper environments, our game fish must dwindle or disappear. The requisite conditions are: adequate spawning beds; enough shelter; sufficient food. The improvement of trout waters by environmental control is the main point of this talk.

Very little has as yet been done in America in the way of improving our trout streams. All trout fishermen are familiar with sections of streams that are not worth fishing, because there are no good pools in which trout can live. Men who know their streams take short-cuts across bends, passing by such fishless stretches. If all the energy spent in the long trek between pools could be devoted toward improvement of the water that is skipped, trout fishing would bear less resemblance to golf. Do you care for long walks after you reach your trout streams? Or would you rather spend more time in actual fishing? Less distance between pools means "less time between bites"--the ideal which President Hoover has set for us.

Although it is very apparent that the basic principle of environmental control is sound in theory, very little practical application of this principle has been seen in this country. It has long been recognized in Great Britain, that many steps could be taken to improve existing conditions in trout waters. A large fund of practical experience has been built up during generations of attention to streams by their keepers or owners. Several excellent books dealing with stream improvement have

been published in Great Britain (the books of Malloch, Armistead, Mottram, Platt and others are referred to).

We, in Michigan and surrounding regions, will do well in making our pioneer efforts to consider facts learned from the longer experience of others. At the same time, we must bear in mind that our streams are mostly very different from those of other countries. The majority of British streams are under an intensive system of private control, which allows the employment of some methods which are not practical to use in our vast lengths of public water. Moreover, our climate creates great danger from high water temperatures, an important point to consider in planning our stream improvement methods. The climate of the British Isles makes it possible for streams there to be more exposed to the sun than ours can safely be.

A recent work, Hewitt's book Better Trout Streams, has given excellent attention to some problems of environmental control in American streams. Many good ideas have been put in practice on streams controlled by that author. On the other hand, some of the methods which are successfully employed on these streams, located in the Catskill region of New York state, are not applicable to the usual Michigan conditions. Successful work, in our waters, depends upon the adoption of methods which are successfully used elsewhere, but only after we make sure that these are suited to the needs of the streams to which they are to be applied. It is sometimes necessary to devise new means to accomplish certain purposes in our waters.

The Michigan Department of Conservation has been trying out methods of trout stream improvement for several years. Particular attention has been given to the problem of providing cover, or shelter for trout. Dr. Jan Metzelaar began studies of the "re-snagging" of streams several years ago and many of the log shelters which he built have created good trout pools and have remained solidly in place. With the creation of the Institute for Fisheries Research, early in 1930, plans were made for the expansion of this field of investigation. Mr. Clarence M. Tarzwell, who holds a fellowship under the Institute, has devoted two season's work to the experimental improvement of trout streams by the introduction of pool-producing devices, and shelters. Since stone work is being employed as well as logs, the term "re-snagging" which has been

somewhat used, is hardly a good word for this type of work.

In 1930, by means of an appropriation for an improvement project on the Little Manistee river, the Department of Conservation made possible the first really large scale work that has been undertaken in the waters of the state; probably the first in any of the public waters of the country. Through the cooperation of conservation officers, a crew of three men, experienced in handling logs, was secured. The ~~planting~~ planning and study of the methods and effects of the improvement work was done by the Institute. During 1931, the Department, in connection with the Pigeon River Forest project, engaged the Institute to carry on similar stream improvement there. During 1931, Mr. Tarzwell undertook the planning and study of two separate undertakings on privately controlled streams, where the expenses were borne by the landowners. In this way, it was possible to expand the study quite materially. In addition, a few other experimental improvements have been built directly by the Institute, in waters open to public fishing.

At the present time 875 numbered improvement devices are under observation, distributed in the following streams: Little Manistee River in Lake County, Pigeon River in Otsego and Cheboygan counties, the East Branch of the Black River in Montmorency County, Gamble Creek in Ogemaw County, Huron River in Washtenaw County, and the River Rouge in Wayne County. All of these streams are trout waters, with the exception of the Huron River.

These experiments in trout stream improvement have proved to us that it is possible and practical to increase the supply of trout by improving, the spawning facilities, the shelter and the food for the trout, where, as and ~~and~~ if needed. The experiments have taught that it is possible to modify the stream for the better, at a low cost, and in a lasting way.

Without going into the details of the methods of improving the streams, or of the design of the various devices to modify the current, depth, bottom and food supply of the water, I will very briefly indicate how a stream can be modified so as to increase its trout production. The details of methods and design will be dealt with in a

bulletin on Methods of Improving Michigan Trout Streams, now being completed for early publication by the Institute for Fisheries Research of the University.

Many of our Michigan trout streams, or long sections of them, are devoid of natural spawning grounds. It is of course important to supplement stocking of these waters by natural reproduction. It has proved possible to produce the gravel conditions fit for spawning where they did not formerly exist. One method which has been tried with success is the hauling of gravel into a feeder stream devoid of natural gravel. Another method of proved utility has become apparent from our experimental work on the Little Manistee River. Here a number of log and stone constructions have speeded up the current so as to wash out the sand and thus to expose the original gravel bottom of the stream. And trout have already utilized these artificially exposed gravel stretches for their spawning activities.

Many of our Michigan trout streams, or portions of them, are sadly lacking in cover, and trout will not remain where they have no place to hide, to call their home. Every angler knows stretches of familiar streams which contain no shelter and no trout. We have taken such stretches, provided shelter therein and have proved that trout have taken quickly and readily to the homes provided for them. As an example I will cite a long bend of the Little Manistee River in which there were no trout holes and no trout, so that the anglers wise to the stream avoided this long unproductive stretch by cutting across a narrow neck of land. As an experiment this stretch was improved in 1930. Log devices were installed to deflect or concentrate the current, so as to force it to dig such holes as trout love to lie in, and other shelter was provided. In the spring of 1931, good catches of trout were made in this formerly unproductive stretch. Now the wise angler will not skip this mile of the stream, which has cheaply and effectively been made to add to the trout catch of the river. This experience has been general. Hundreds of miles of now troutless or nearly troutless stream courses in Michigan can be made habitable for trout.

Trout can not grow well unless they have the proper amount of their natural food. Since very little trout food grows in a soft sand bottom, while much develops on gravel,

every one of our devices which removes sand^d exposes gravel has increased the food growth. Still more productive of food are the weed beds in the stream. It has been proved possible, both in Europe and in Michigan, to increase the weed beds where they are too few, and so increase the food supply,--and also the shelter,-- for the trout. Furthermore, the log and brush shelters put in the streams provide much food, for the insects hatch and crawl about on such material in great quantity.

You may ask why our trout streams need improvement. It is partly because they were made in response to various natural laws and not for trout. Knowing what conditions make for trout existence, multiplication and growth, we are able to make these streams more suited to trout life than they naturally were. Logs naturally lying in a stream may merely pile up sand or become covered, without benefit to the trout, but the same logs intelligently fixed in the stream so as to increase the current, dig holes and to provide cover and food for the fish, will make the trout production of the stream markedly greater.

Further, many of our streams have been all but ruined by human agencies. Cutting of forests and agriculture have often made the streams too warm, and have caused sand to wash in, to smother the food. Often the stream has been cleared of all snags or other trout cover, to facilitate the floating of logs or pulp wood. At times the streams have been cleared of fish shelter in the mistaken idea that so doing improves the appearances of the stream. Not only the natural, but also the artificial shelters and current modifiers, may greatly increase the charm of the stream, by diversifying the water course, current, surface and bottom. The riffles produced often increase the attractiveness of the stream, by adding to the music of the flowing water.

There are many whole streams, and long sections of others, which can be made to produce more trout if they are properly improved. Probably none of our streams are ~~not~~ capable of producing more fish and more fishing if they are properly improved.

~~More trout fishing~~ More trout fishing means more health and more happiness; and more income to the northern part of our state. That is vital, for the very life of our northlands is dependent upon the development of its greatest resources: its pure air, open spaces and its wildlife.