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The Lake Trout Planting Experiment in Lake Michigan

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How much good is being accomplished by planting lake trout in the Great Lakes? Most commercial fishermen and sport trollers think that stocking a million or so two- to four-inch fingerlings each year helps to maintain their catch but nobody actually knows.

In December 1944 the Wisconsin Conservation Commission, which was being urged to expand lake trout propagation, called a conference of all states fronting on Lakes Michigan and Superior to meet with the United States Fish and Wildlife Service to discuss the value of artificial propagation of the lake trout. At that meeting in Madison all angles of the subject were reviewed and it was agreed that a cooperative research program should be launched to secure more facts about the life history and habits of the lake trout and the value of fingerling planting.

Fish culturists, biologists and administrators at the conference were pretty much in agreement that the planting of fry (tiny fish just hatched from the egg) was probably of little value and that allowing

the lake trout to spawn naturally by establishing proper closed seasons was at least as efficient as fry planting. Everyone recognizes that there is a heavy loss in taking spawn and in rearing lake trout to a length of two to four inches in a hatchery. How much loss there is in nature to this size is not known because there has been little study of the spawning habits of lake trout and of the mortality suffered by eggs and young fish in natural waters. However, since hatching and fingerling rearing facilities are available in several states fronting the Great Lakes it was considered desirable to test the actual returns to the fishermen from planting fingerling trout before expanding this program or putting the stations to other use.

A technical committee was appointed at this conference consisting of a biologist from each state¹ with Dr. John Van Oosten of the United States Fish and Wildlife Service as chairman. After several meetings and much correspondence the following cooperative program to start this investigation on Lake Michigan was adopted by the states and the Service.

1. From 1944 to 1946 rear and plant as many fingerling lake trout as possible marking at least ten percent of the number stocked each year by removing different fins.
2. Plant all of the fin-clipped trout in a localized area (Fox Islands) in northern Lake Michigan so as to learn the movements of the fish and to increase the chances for recoveries by fishermen.

¹In September 1946 the Province of Ontario because of its interest in the lake trout in the Great Lakes was invited to join in this study.

3. Continue the usual egg collecting methods and fry planting in 1944-1946. Permit no spawn fishing in 1946-1948 for the purpose of planting either fry or fingerling lake trout in Lake Michigan in 1947-1949.
4. Adopt uniform methods of reporting the commercial catch of lake trout on Lake Michigan.

Michigan and Wisconsin agreed to fin-clip the lake trout fingerlings to be supplied by the U. S. Fish Hatchery at Charlevoix, Michigan. Michigan was assigned the job of conducting experiments to learn the effects of fin-clipping, on growth and mortality, and to determine the extent of fin regeneration. Wisconsin agreed to collect data from the gill net catches and scale samples for growth studies by the U. S. Fish and Wildlife Service. The Service also agreed to make the statistical studies of the fishermen's catches and to correlate these with plantings; it also assisted in the fin-clipping.

The first part of the program has now been completed. Of a total of 3,277,402 lake trout fingerlings planted in Lake Michigan in the three-year period, 411,394 (12.6 percent) have been fin-clipped. Using a one percent ether solution to quiet the fish, different fins were clipped for each year's planting. In 1944 the back and fatty fins were removed from 100,280 fingerlings which averaged 2.9 inches in length. This represented 9.2 percent of the total planted.

In 1945 the right front fin was clipped from 159,712 fingerlings averaging 3.2 inches in length, and this number was 12.3 percent of all fingerlings stocked.

In 1946 the marking crew removed the left front fin from 151,402 fish or 17.1 percent of the total planted; these fish averaged 3.2 inches in length.

Loss due to handling and clipping was 1.95 percent in 1944, 0.16 percent in 1945, and 0.11 percent in 1946.

Considerable publicity has already been given to this experiment in newspapers and in The Fisherman which is a magazine having wide circulation among commercial fishermen of the Great Lakes. The purpose of this article is to remind all who take lake trout in Lake Michigan that starting this season (1947) some of the trout marked in 1944 may enter the chub net catches and that for the next ten years or so fin-clipped trout may be caught by various types of gear or by sport trolling. Posters like the one reproduced on the back cover of the magazine are being placed in all fish houses, commercial fishing boats, and at sport trollers' docks around Lake Michigan. It is hoped that every marked fish caught will be reported to the nearest conservation officer so that complete information may be secured on returns from the plantings and the movements and growth of the lake trout.

To stimulate interest in making these reports and to compensate the fishermen for the slight mutilation of marketable trout a reward that of \$2.00 will be paid for each lake trout[^] was fin-clipped in the experiment. Each state fronting Lake Michigan has agreed to pay this reward for fish taken in its waters upon presentation of the proper evidence. Rewards will be paid for undersized lake trout as well as those which can be marketed.

As the pictures show, some fins may be partly grown back, but in most cases the fins will be completely missing. A partially regenerated fin has certain characteristics which make it quite easy to distinguish from the normal. The rays in it are twisted and irregular and frequently are not all present. The skin from the scarred area immediately around

the missing or partly regenerated fin of the legal-sized trout will be cut off by the conservation officer and scale samples taken to check on their value for rate of growth studies. Legal fish will then be returned to the fisherman; undersized trout will be retained for further examination and study.

In order to learn the effects of fin-clipping on mortality and growth and the extent of fin regeneration, equal numbers of marked and unmarked lake trout fingerlings were taken at random each year from the fish at the Charlevoix Station and transferred to the Marquette Hatchery. The information that follows has been taken from a progress report² prepared by Dr. David S. Shetter who has had general supervision of Michigan's part in the fin-clipping program and who has been in charge of these control experiments.

To test the effects of removing the back and fatty fins on mortality and growth rate, 2,000 unclipped and 2,007 clipped fingerlings were placed in a single pond in September 1944, and 1,003¹ fin-clipped fingerlings were placed by themselves in a separate pond to determine the amount of fin regeneration. In March 1945 these numbers were reduced to 1,005 each of the clipped and unclipped trout in the one pond and to 500 in the other to avoid overcrowding. In 1945 and 1946 approximately half the number employed in 1944 were used for similar studies. Ponds were drawn down in March and October each year starting in 1945 and the fish counted and examined. Only the experiments involving the back and fatty fin (1944) and the right front fin (1945) are reported on here as the

² Report No. 1091 of the Michigan Institute for Fisheries Research entitled "Progress Report on the Control Experiments involving Marked and Unmarked Lake Trout Fingerlings at the State Fish Hatchery", Feb. 10, 1947, by David S. Shetter. This report has been mimeographed and copies are available to any one who is interested in the details of this experiment.

left front fin (1946) experiment had just started when the check was made in October 1946.

Losses in all lots of fish were quite high in both experiments, but enough survived to give reliable results. Five percent fewer marked than unmarked trout were present in the pond containing the 1944 experimental fish. In the 1945 group there was a four percent difference also in favor of the unclipped fish. This does not necessarily mean that fin-clipping caused the apparently higher loss since any trout with fins completely grown back would be counted as unmarked, thereby adding to the survival percentage of the unmarked fish and subtracting from that of the marked fish.

There was no significant difference between the growth of the fin-clipped and the unmarked fingerlings held in these ponds. The fish from which the back and fatty fins had been removed in 1944 grew 1.3 percent less than the unmarked individuals, but those marked in 1945 by removal of the right front fin had grown 0.8 percent more than the unclipped fish by the end of the first year of the experiment.

As shown in the illustrations, the fins of some fish will grow back, especially if not clipped close to the body. Of the fingerlings from which the back and fatty fins had been removed 2.8 percent showed complete regeneration of both fins so that if they had not been held in a separate pond they would have been considered as unmarked. Although some regeneration of either or both fins occurred in 47.6 percent of the fish, 91 percent were considered clearly recognizable as having been marked. Of the fish marked in 1945 by removal of the right front fin and held in a separate pond only 21.6 percent showed any regeneration at all, but on 2.1 percent the fins were fully grown back. About 96 percent of this lot had marks clearly recognizable, that is the fin had

regenerated one-half or less in the course of a year. Apparently regeneration, if it is going to occur, does so within a year as the percentage grow-back was essentially the same at the end of eighteen months as at the end of a year in the case of the 1944 fish.

If the control experiments in the hatchery ponds indicate what may be expected in Lake Michigan--and we believe they are reliable guides as to relative mortality and growth of marked and unmarked fish--the percentage of trout recovered by fishermen from these plantings, properly adjusted for regeneration and relative mortality, should give an answer to the value of lake trout fingerling planting in this lake. Also the discontinuance of all plantings in Lake Michigan for a three-year period should be reflected in the commercial catch records in subsequent years if such plantings are a significant factor in maintaining the fishing.

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Captions for Illustrations

- Figure 1. Unmarked two-year old lake trout
- Figure 2. Lake trout showing no regeneration of the back and fatty fins.
- Figure 3. Partial regeneration of back and fatty fins.
- Figure 4. Almost complete regeneration of back and fatty fins.
- Figure 5. Lake trout marked in 1945 by removal of the right front fin; the normal left front fin and scar of the fin removed as they appear at the end of the first year.
- Figure 6. Partial regeneration of the right front fin at the end of one year.
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