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A FURTHER STUDY OF THE RELATIONSHIP BETWEEN UNTREATED DOMESTIC SEWAGE AND CONDITIONS FOR FISH IN THE TAHQUAMENON RIVER

By

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Reference is here made to Institute for Fisheries Research Report #1074 by Paul H. Eschmeyer, which covers the preliminary study done on this body of water in 1946. The facts covered were that untreated domestic sewage originating in the city of Newberry and the Newberry State Hospital is discharged into the Tahquamenon River at a point one mile north of the city. Two conduits deliver the material to a point near the south bank of the stream, immediately east of the bridge crossed by State Highway M-48 (T46N, R10W, Sec. 24). The Newberry Lumber and Chemical Company, which was dismantled several years ago, was serviced by a third conduit adjacent to the above, which used to carry away their industrial wastes. The removal of this plant has eliminated this source of pollution which had proved to be markedly unfavorable to conditions for fish in an extensive section of the stream. Since the exclusion of these highly toxic wastes, the relationship

between the continuing domestic sewage pollution and fish life in the section of the stream concerned, is of increased significance.

On September 6, 1946, Mr. Eschmeyer, of the Institute Staff, accompanied by Conservation Officer Richard Beach of Newberry, made an inspection of a section of the river extending from the M-48 bridge to a point approximately 1-1/2 miles downstream. Dissolved oxygen in p.p.m., and pH determinations were made at five stations in this section. The results indicated that there was no significant effect on the amount of oxygen present in the stream at the water levels of that date, nor was the hydrogen ion concentration materially affected. However, it was recommended that further study be made as it was feared that an abnormal rainfall preceding these first tests might have had some effect on these findings.

On July 29, 1947, the writer, accompanied by Mr. Chester Harvey of the Stream Control Commission, made an inspection of this section. Water levels were normal for this season. The six stations were located as follows:

Station 1: At M-48 highway bridge.

Station 2: At old R.R. bridge, approximately 1/2 mile below the highway bridge.

Station 3: One mile below R.R. bridge.

Station 4: 2-1/2 miles below R.R. bridge.

Station 5: 4 miles below R. R. bridge.

Station 6: 6 miles below R. R. bridge.

Oxygen determinations are shown in Table I. (In Table I-A are given the 1946 results). All samples were taken at mid-stream, one foot beneath the surface, as in 1946.

Table I.--Oxygen Determinations, Tahquamenon River, July 29, 1947.

Station number	Dissolved oxygen, p.p.m.
1	6.4
2	6.2
3	6.4
4	7.0
5	7.4
6	7.0

Table I-A.--September 6, 1946

Station number	Dissolved oxygen, p.p.m.	pH
1	7.90	7.5
2	7.64	7.5
3	7.59	7.4
4	7.75	7.4
5	7.49	7.4

Small particles of sewage in suspension were noted in gradually diminishing amounts with downstream progression. Odors associated with sewage were noted only in the immediate vicinity of the inlets. Animals which often indicate pollution were not found in any unusual numbers.

Local observers had also stated that evidence of sewage had been found as far down the river as Deddman's Farm, approximately 17 miles below Newberry, and that there was little fishing above this point.

During this study, a boat trip was made from the highway bridge to McPhee's Landing (T46N, R9W, Sec. 22), approximately seven miles downstream. The results again indicated no significant effect of sewage on the amount of oxygen present in the stream at the time of observation. No hydrogen ion determinations were made. Small particles of sewage in suspension were noted throughout the section, diminishing in abundance as progression was made downstream until they disappeared approximately two miles below the highway bridge. At the existing temperatures (air - 86° F., stream - 77.0 - 77.5° F.) and water level, odors were again present only in the immediate vicinity of the source of the sewage. A few small areas were noted where methane gas was being released. Sludge banks occurred at intervals for about five miles, then gradually disappeared as the downstream section changed in character from slowly moving water, swampy cut-over hardwoods with many oxbows, to highbanked second growth hardwood, sparsely intermingled with conifers.

The presence in great numbers of the floating brownleaf pondweed (Potamogeton natans) served the dual purpose of reducing, with progression downstream, the sewage in the original section by collecting the passing particles and by slowing the current of the river. At times it was necessary to pole the boat through dense beds of this plant.

No fish life was observed in the first four miles of the drift. There were few deep holes and the shallow, sand-choked channels offered few, if any, suitable habitats for fish. In the last two miles, many

minnows and yellow perch were observed. Several bass were seen jumping in the slack waters of the oxbows. At McPhee's Landing two fishermen caught eight perch in half an hour, but all were sub-legal in size.

Adverse effects of domestic sewage on conditions for fish in the Tahquamenon River below Newberry are not revealed by the observations here described. The sewage reported observed at a distance of 17 miles from Newberry was undoubtedly decomposed algae.

It is the opinion of the writer that the section studied is still recovering from the effects of long disposal of the toxic wastes by the Newberry Lumber and Chemical Company. The general aspect of the stream; the choked channels, high water temperatures and the slow current preclude any possibilities of extensive utilization of the entire section by fishermen, at least during periods of low water levels.

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FISH DIVISION

The Sea Lamprey Problem

The most serious threat to the prosperity of the commercial fishing industry is the increase in number of the sea lamprey which now has penetrated to all of the Great Lakes, including Lake Superior, the last to be invaded by this parasite. Long an inhabitant of Lake Ontario and tributary waters, it was blocked from access to the upper lakes by the insurmountable Niagara Falls. In 1921, however, the lamprey was found in Lake Erie, having probably gained access by means of the man-made Welland Canal. By 1930 it had invaded the St. Clair River, and by 1936 was widely established in Lakes Huron and Michigan.

According to the latest reports, spawning runs now occur in 68 Michigan streams, of which 30 are tributary to northern Lake Michigan, 17 in northern Lake Huron, and 10 tributary to Lake Superior. The latter, however, have not been authenticated. There can be little question that lamprey spawning runs also occur in tributary streams in Ontario, Wisconsin, and other states on the Great Lakes. The first spawning runs in Michigan were observed in the Clinton River near the Macomb-Oakland county line in the Ocqueoc River in Presque Isle County in 1938 and 1939.

In cooperation with the East Presque Isle County Sportsmen's Association, a trap was operated on the Ocqueoc River in 1944 and 1945 in which more than 7,500 lampreys were taken and destroyed. An estimated 30,000 lampreys were destroyed in the spring of 1946 in a privately-operated trap below the dam in the Manistique River at Manistique, Michigan

The upstream spawning migration may take place anytime between April and August, but the peak of the run probably occurs in late May or early June when the water temperature is between 59 and 70 degrees. Nests are hollowed out of gravel areas in from eight to 30 inches of water. The adults attach themselves to stones by means of their sucking mouths for completion of the spawning act, after which the nest is covered. What little information is available indicates a female lamprey, according to size, is capable of deposition from 100,000 to 300,000 eggs. The eggs are adhesive for a short time, adhering to the stones and particles of sand in the nest. It is believed the adults die within a few days after spawning.

The eggs hatch in about three weeks. The minute larvae then burrow into the nearest mud or silt bank where they remain for four or five years and change form. When the larva has attained the parasitic stage, it is from six to eight inches long. From this stage it takes from one to three years to mature.

In the parasitic stage, it preys principally upon lake trout, although whitefish, walleyed pike, burbot, suckers, and possibly other species also are victims. Fresh lamprey sores and scars from previous sores have to a greater or lesser degree in various parts of the lakes affected the market value of the fish. It is believed that while generally lampreys leave a fish before death occurs, the fish may be so weakened as to die later or be easy prey for other enemies. Two fishermen operating out of Milwaukee in the winter of 1945-1946 claimed to have lifted from 500 to 700 pounds of dead trout washed into gill nets set on grounds occupied by trout during the previous spawning season. The continuous decline the last few years in the commercial production of fish in Lake Huron may be attributed in part at least to the increase of the lamprey.

Without removal of the original source of the invasion, there is no assurance the problem in the upper lakes can be permanently solved. Any effort that will relieve this problem will be costly because of the area of waters and number of spawning streams involved.

More needs to be known concerning the problem, such as how much damage is done to the commercial fisheries, where and when the lamprey spawns, for how long a period it runs, whether it spawns in the Great Lakes, if it dies after spawning, how long the young remain in the spawning area, how long a time is required for hatching and developing in different areas, and at what stage or stages in the life cycle of the animal its numbers can be substantially reduced. These and many other questions need answers before control measures can be planned and applied.