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A PRELIMINARY STUDY OF THE RELATIONSHIP BETWEEN UNTREATED DOMESTIC SEWAGE AND CONDITION FOR FISH IN THE TAHQUAMENON RIVER

by

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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 (T 46 N, R 10 W, Sec. 24). A third conduit, adjacent to the above, formerly served to convey industrial wastes from the Newberry Lumber and Chemical Company. Recent dismantlement of the Company's plant has eliminated this source of pollution, which has in the past proven markedly unfavorable to conditions for fish in an extensive section of the stream. Exclusion of these highly toxic wastes has given the relationship between the continuing domestic sewage pollution and fish life in the section of stream concerned an increased significance. An evaluation of that relationship is here considered.

On September 6, 1946, Conservation Officer Richard Beech of the Newberry Headquarters accompanied the writer on an inspection of a section of the River extending from the M-48 Bridge to a point approximately 1-1/2 miles

downstream. Observations were made at 5 stations within this distance, as follows:

Station 1 - At the M-48 Bridge, upstream from sewage inlet.

Station 2 - At the Newberry Lumber and Chemical Company Railroad Bridge, about 300 yards downstream from sewage inlet.

Station 3 - One-half mile below M-48 Bridge.

Station 4 - About one mile downstream from M-48 Bridge, at a point known locally as "Tom Fool's Bend".

Station 5 - One and one-half miles downstream from the Bridge.

The results of the chemical analyses made are shown in Table I. The Rideal-Stewart modification of the Winkler Method was used in the oxygen determinations. All samples were taken at mid-stream, one foot beneath the surface.

Table I

Oxygen and pH Determinations, Tahquamenon River

September 6, 1946

Station No.	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

The results indicate no significant effect of the sewage on the amount of oxygen present in the stream at the water levels existing at the time observations were made. (These levels were estimated by Mr. Beech to be from

12 to 18 inches above "normal", possibly largely as a result of a 1.17 inch rainfall during the preceding night.) Dissolved oxygen varied within limits of less than one-half part per million at the 5 stations at which determinations were made, and was at no point limiting to aquatic life. Hydrogenion concentration in the stream was not materially affected by the sewage, and an increase in turbidity (as measured by a Secchi disk) could not be demonstrated. Small particles of sewage were in suspension throughout the section examined, in slowly diminishing abundance with progression downstream. At existing temperatures (air 68° F; stream 58 to 59° F.) and water levels, odors associated with domestic sewage were present only in the immediate vicinity of its inlet. No areas of soft bottom were found which, when present, readily release unusual quantities of methane.

Except for the area within about 200 yards of the sewage inlet, biological conditions in the stream appeared not to be adversely affected. Animals often indicating pollution when they are present in great abundance (e.g., Tubificid worms, Chironomid larvae, Sphaeriid molluscs, flat worms) were not found in unusual numbers. At the stations examined, water mold (Sphaerotilus) was not found to be forming characteristic fringes on materials in the river, as commonly occurs in polluted waters.

Adverse effects of domestic sewage on conditions for fish in the Tahquamenon River below Newberry are not revealed by the observations here described. However, temperature and water levels at the time of the study preclude the acceptance of these results as conclusive. Further study of this section of stream during mid- or late-August is strongly recommended, to determine whether the amount and quality of the sewage is such as to exert critical effects on the stream fauna during periods of low water level and high stream temperatures.

Report approved by A. S. Hazzard
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