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Algal Blooms in Silver Lake*

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THE ROCHESTER COMMITTEE FOR SCIENTIFIC INFORMATION
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Water Pollution

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Algal Blooms in Silver Lake
by
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Summary

The first bad algal bloom occurred in Silver Lake in August 1969, and a much worse bloom occurred a year later. A search for the source of fertilizer disclosed fifteen pipe outfalls in the first 800 feet of inspected shoreline. A simple dye test showed that at least one pipe drained household sinks directly into the lake. Other pipes also discharged detergents. Silver Lake, located in Wyoming County, New York, is becoming degraded by eutrophication, first by overgrowth of rooted plants in shallow water, and now by blooms of floating algae in the whole lake. The discharges of detergents and other fertilizers along the shores are not controlled by the Village of Perry or Castile Township.

Background

Silver Lake is located in the Genesee Region of New York State in the east-central part of Wyoming County, southeast of Buffalo and southwest of Rochester. It covers 761 acres, is about three miles long and one half mile wide. Maximum depth is 37 feet. The water of the lake is utilized for drinking and domestic purposes by the villages of Perry, LeRoy, Mt. Morris, the hamlet of Perry Center, and the residents of Silver Lake's eastern shore.

On the shores of the lake and immediately above the shoreline are some 900 dwellings, a majority of which are summer cottages. Perhaps 80 percent of these dwellings are situated on the east side of the lake. Construction of these buildings started in the late 19th century, and the preponderance of those still in use were completed before 1940. Except for a very few dwellings which boast leach fields (these are situated well above the lakefront), the disposal of septic waste is via a sealed septic tank which is periodically pumped out.

Beginning some twenty years ago, there has been a gradual increase in the yearly crop of rooted water plants. These plants, primarily eel grass, became so bothersome that the Village of Perry purchased a weed cutting machine about seven years ago. This machine was used in an area of about 80 acres in the northeastern corner of the lake which is within the incorporated limits of the Village of Perry. This shallow area also includes the inlet and outlet of the lake. Weed cutting operations were eliminated some four years ago in response to complaints of lakefront property owners; the cut weeds were washing up and rotting along the shoreline.

Also over the past twenty years there has been, towards the end of each summer, a mild proliferation of free-floating algae in the lake waters. These have appeared to be multicellular clumps of a green algae. Up to the summer of 1969 these August algal growths were not bothersome; they did add somewhat to the turbidity of the

water, but were shrugged off by residents of the area with the explanation that, "the lake was turning." In late August of 1969 an algal bloom occurred which did cause concern, i.e., it made swimming esthetically undesirable, and resulted in a premature emptying of a few campsites on the east shore.

Current Situation

During the second week of August 1970, Silver Lake experienced its first extensive algae bloom. The prevailing winds carried the floating algae to the heavily populated eastern shore where they collected in a thick green blanket covering the water within fifty feet of the shoreline.

During the last week of August, while the algal bloom was continuing, a secondary bloom of single-celled blue-green algae occurred. This secondary bloom remained suspended in the water, resulting in a patchwork of clumped green algae against a contrasting background of very turbid, blue-green water. Because of the continuous concentration of these blooms by the wind, it was not possible to estimate the lakewide concentration of algae.

At this point it was decided to attempt to discover the sources of the fertilizers which were giving rise to the algal blooms. A careful inspection of the surface waters failed to demonstrate the presence of sewage solids. Inquiries among the year-round residents and the operator of the sewage pumping service failed to suggest a source of the fertilizer in the lake water.

A Tracer Experiment

Mr. Robert Murphy, a year-round resident of the area, recalled that his dwelling, in addition to the sealed septic tank, had a grease trap which did not flow into the septic tank. In order to test whether this plumbing arrangement might be a source of lake fertilization, a tracer experiment was conducted on 12 September 1970 at 62 Walker Road, Perry, N. Y. This year-round dwelling is about 200 feet from the lakeshore.

Made up a mixture of two packages of RIT scarlet red fabric dye in three gallons of hot water.

12:55 PM Above dye mixture was poured into kitchen and bathroom sink drains at the address shown.

1:03 PM On shore of lake directly behind address shown. Observed flow of red dye from ten inch ceramic outfall pipe crossing lakeshore and entering lake waters.

A Search for Outfalls

12 September 1970, weather fair, light rain yesterday afternoon. Walking North along east shore of Silver Lake. Measurements are from the Institute Dock at the foot of Wesley Avenue (Township of Castile).

8 feet: 10 inch outfall pipe - storm drain.

50 feet: Square wooden outfall - no flow.

70 feet: 12 inch corrugated drain pipe - no flow.

100 feet: 12 inch corrugated drain pipe - small flow of runoff water.

125 feet: 12 inch cast iron pipe - 5-6 gals/min runoff water.

At 150 and 170 feet north of starting point and at foot of Camp Road - three more outfalls, all with low flow of runoff water.

At 120 feet North of Camp Road terminus (Village of Perry) - found a 4 inch cast iron drain pipe concealed beneath a 10" X 10" railroad tie. The dribble of water coming from this pipe appeared to be storm runoff, but was accompanied by a strong odor of decay.

At 170 feet North of Camp Road terminus, eight feet south of a striped cabana - noticed seepage of a turbid liquid from the cinder path at a point some four feet to the landward side of the railroad tracks. This slightly foamy liquid appeared to contain detergent, and had stained the soil a greenish-white color in its flow path to the lake waters.

At 70 feet North of striped cabana - noted an outfall concealed in a wooden case. Flow rate about 1 gal/min, odor suggestive of detergents. Heavy scum of algae growing on flow plate, light foam could be seen at partially concealed splash point.

120 feet North of striped cabana - Outfall behind 62 Walker Road already mentioned in the previous section. Detergent suds still on beach, soil and portions of beach now dyed red.

170 feet North of striped cabana - eight inch square wooden storm drain - no flow.

220 feet North of striped cabana, at base of redwood steps leading to beach - found a 4 inch ceramic outfall pipe with flow rate of about 0.5 gal/min. Much detergent foam on beach, slime algae growing in mouth of pipe and along flow path to lake waters.

100 feet South of public swimming beach (Village of Perry) below junction of Euclid and Lake Avenues - 12 inch cast iron pipe concealed in bushes. Flow rate from pipe about 2 gals/min, detergent scum and heavy algae growth along flow path to lake waters.

Discussion

Certainly no broad conclusions may be drawn from the results of this preliminary investigation. The two algal blooms demonstrate that, at least on those two occasions, Silver Lake was over-fertilized. The fact that the 1970 bloom occurred earlier in the year and was more intense than the 1969 bloom, coupled with a consideration of the lake's history, suggests that more extensive blooms may be anticipated. The flow of residential liquid wastes into the lake has been demonstrated.

Ideally, the solution to the liquid waste problem would be the installation

of sewer lines around the lake. Unfortunately this expensive task is not yet being seriously considered by the municipalities concerned. The town nearest to the lake's center of population, Perry, has not yet constructed a sewage treatment plant; the town's untreated wastes are dumped into the Silver Lake outlet whence they are carried to the Genesee River. The residence from which the RIT dye was traced is within the Perry village limits, but is not yet sewered.

The advent of sewer lines may be hastened by an early algal bloom in the next few years. Because these blooms tend to deposit along the heavily populated eastern shore, the economic consequences of falling property values, decreased tax revenue, and failure of tourist-dependent businesses may be felt more quickly in this situation than in some others. In the meantime we remind residents of the lake area to use low phosphate laundry products to minimize lake water fertilization and, while the laundry is in the machine, consider how the community could provide for tough, working control of lake pollution.

I am indebted to Mr. Thomas Benson for his assistance in collecting the data in this report.