

## EVALUATION OF WATER QUALITY AND RESTORATION OPTIONS FOR BAKER LAKE, MICHIGAN

**Contact:** Mr. Richard Cipri, Owner  
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**Project Costs:** K&A: \$55,000

**Project Completion:** 2000

Baker Lake is located approximately one mile southeast of Lawrence, Michigan in Van Buren County. Emergent aquatic plants, extending to distances of up to approximately fifty feet from the shoreline, encircle the perimeter of the lake. The remainder of the lake consists of open water, with a maximum depth of approximately 29 feet.

Access to Baker Lake has been restricted to private use for over 70 years as portions of the drainage basin and areas immediately surrounding the lake are fenced. Likely due in part to this restricted access, gamefish in Baker Lake were historically noted by users to be abundant and large in size relative to other public access lakes. The lake supported a variety of fishes including largemouth bass, bluegill, crappie, perch, pickerel and walleye.

In August of 1991, severe discoloration and siltation of the lake coincided with a massive fish kill. Also observed during this period of time by the property owner was a notable discoloration and odor in a tributary flowing into the lake from the south. It was determined that the discoloration in this tributary was sweet corn silage runoff (leachate) from a farming operation located immediately south of the lake within the drainage area of the inflowing tributary.

The silage discharge to the lake resulted in severe dissolved oxygen depletion initially in the surface waters of the lake and subsequently, in the bottom waters. The loss of dissolved oxygen, combined with fine particulates associated with the silage leachate, was responsible for the massive fish kill in the lake. For nearly ten months, silage leachate continued to flow into the lake because of limited abatement efforts undertaken by the farming operation despite regulatory intervention. The sedimented organic materials from the discharge event have created a significant sediment oxygen demand which will likely cause long-term dissolved oxygen depletion problems.

KIESER & ASSOCIATES (K&A) was retained by the Baker Lake property owner to evaluate water quality, fisheries and restoration feasibility following the discharge event. Lake restoration feasibility included: 1) engineering design and specifications for a ten-year, lake-wide, bottom water aeration program; 2) sediment treatment (complexation) using buffered alum (sodium aluminate), and; 3) intensive water quality, sediment and fisheries monitoring to track short-term conditions for optimizing treatment system performance and track long-term lake water quality improvements.

These recommendations were included as part of the expert testimony provided by Mr. Kieser in a civil court trial. This testimony required the presentation of four years of technical data to a lay jury. Data included evaluation of pollutant loadings, lake bottom mapping, biological and water quality impact assessment, sedimentation and sediment quality issues. In part, this testimony resulted in a favorable verdict for the lake owner on civil suit charges. Long-term implementation of the lake improvement program was not implemented, however, due to high legal fees and a limited jury award.